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LEARNED HELPLESSNESS AND REACTIVE DEPRESSION

by

© CHUNG-NGOK ISAAC TAM

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled LEARNED HELPLESSNESS AND REACTIVE DEPRESSION submitted by CHUNG-NGOK ISAAC TAM in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

An attempt was made to find out if Miller and Seligman's (1973) learned helplessness findings among nonclinically depressed college students could be generalized to clinically depressed psychiatric patients. There were four groups of 20 subjects each: endogenous depressives, reactive depressives, nondepressed psychiatric controls, and nondepressed normal controls. The skill and chance tasks, experimental procedures, and dependent measures were the same as those in Miller and Seligman's study. In the present study, the depressed subjects did not show less skill-versus-chance expectancy changes than the nondepressed. Neither did the reactive depressives differ from the endogenous depressives. There was also no correlation between the severity of depression and the amount of expectancy changes. In sum, the present study did not find any of the expectancy changes predicted by the learned helplessness model of depression. In particular, the absence of response-independence among the reactive depressives casts doubt on Seligman's claim that learned helplessness is most applicable to reactive depression.

The symptoms, notably the lack of hostility and lowered response initiation, that were claimed by Seligman to be common to both learned helplessness and depression were found in the present study not to be characteristic of reactive depression. Thus, the validity of learned helplessness as a model of reactive depression can further be questioned.

Data were also collected on locus of control, depression, and other personality variables. The results of the present study suggest that while there is a tendency for endogenous depressives to differ quantitatively from reactive depressives, the two groups also have qualitative differences. Although no clear conclusion can be made regarding the nosological distinction of endogenous and reactive depressions, it is most plausible that while there is a general severity factor of depression, there are also relatively distinct depression groups like endogenous and reactive depressions.

Finally, examination of the Eysenck Personality Questionnaire data revealed an interaction between Extraversion and Neuroticism. In depressed patients, who scored high on Neuroticism and low on Extraversion (i.e., high Introversion), the two dimensions of Extraversion and Neuroticism ceased to be orthogonal, while Psychoticism remained independent. This finding is consistent with Eysenck's previous findings.

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CHAPTER I

INTRODUCTION

The Learned Helplessness Model of Depression

Seligman (1972, 1974, 1975) proposed that the learned helplessness phenomenon found in animal studies may serve as a model of reactive depression in man. This hypothesis was originated by his earlier research on the relationship between fear conditioning and instrumental learning. Thus, it is necessary to examine first animal studies on learned helplessness, then their extension studies using human subjects, and finally investigations relating learned helplessness to depression.

Animal Studies on Learned Helplessness

Seligman and his collaborators in two paradigmatic studies (Overmier & Seligman, 1967; Seligman & Maier, 1967) coined the term "learned helplessness" to describe the interfering effects of inescapable shock on subsequent escape and avoidance responding. However, they were not the first ones to study this proactive interference in animals. In 1949, Brown and Jacobs studied the role of fear in the motivation and acquisition of responses. Dinsmoor and Campbell (1956a, b) reported the results of their studies on unsignalled exposure to inescapable shock. In 1960, Carlson and Black examined traumatic avoidance learning in dogs. In 1963, Behrend and Bitterman using goldfish as subjects, investigated the Sidman avoidance response. In the same year, using rats as subjects, Mullin and Mogenson (1963) studied the effects of fear conditioning on avoidance learning. Later, the effect of pretraining on the acquisition and extinction of the avoidance reflex in cats was reported by Zielinski and Soltysik (1964). Thus, prior to 1967, the interference phenomenon of exposure to inescapable shocks had already been investigated in several species using various procedures.

What makes Seligman's 1967 studies different from earlier ones is that he demonstrated the interference phenomenon in a variety of shock conditions, rendered two existing explanations of the phenomenon questionable, and interpreted the results on the basis of his learned helplessness hypothesis. The first paradigmatic experiment (Overmier & Seligman, 1967) involved the exposure of dogs in Pavlovian hammock to inescapable electric shock and the subsequent test for interference of their exposure with instrumental escape-avoidance responding in a two-way shuttle box. It was found that the interference phenomenon did not appear to be dependent on various shock parameters. The interference effect seemed to be a general, reliably-produced phenomenon. Further, two explanations of the interference phenomenon were discredited. First, interference still occurred and was unaffected by the employment of a higher level of shock during the instrumental avoidance training phase, thus casting doubt on the validity of the adaptation hypothesis. The latter claimed that subjects had adapted to shock during the presentation of inescapable shocks and later failed to perform escape-avoidance responses because of insufficient motivation. Second, a doubt was cast on the explanation of interference as being due to learning of incompatible instrumental motor responses by finding that interference occurred in spite of the prevention of instrumental motor responses by curarization during exposure to inescapable shocks. Finally, the behavioral difference of the inescapably-shocked and the unshocked dogs was obvious. An unshocked dog typically barked, ran, and jumped until it escaped. A shocked dog, on the other hand, soon stopped the initial running and howling and reverted to sitting or lying, and quietly whining until the shock was terminated. On succeeding trials, the dog seemed to give up and passively accepted as much shock as the experimenter chose to give. Even occasional successful escapes early in training did not help such a dog to learn. Thus, in addition to their failure to learn that barrier-jumping could produce shock-termination, the "helpless" behavior exhibited by shocked dogs led Seligman to postulate the "learned helplessness" hypothesis of the interference phenomenon.

The second paradigmatic experiment (Seligman & Maier, 1967) examined how the state of "helplessness" was learned by animals. It was suggested that the degree of control over shock during the stage when the animals were in the harness might be an important determinant of the interference effect. In addition to the no-shock group, an inescapable-shock group was yoked to an escapable-shock group. The inescapable-shock dogs could not terminate shock in the harness even if they pressed the panels with their heads. The results showed that only the inescapably-shocked group exhibited subsequent failure to escape noxious shock in the shuttle box. Further, prior experience with escapable shock in the shuttle box was found to mitigate the effects of inescapable shock in the harness on subsequent escape-avoidance behavior. The authors interpreted the results as supporting their learned helplessness hypothesis: dogs "failed to escape shock in the shuttle box following inescapable shock in the harness because they had learned that shock termination was independent of responding" (Seligman & Maier, 1967, p. 1).

Seligman, Maier, and Solomon (1971) defined more formally the meaning of response independence in terms of "uncontrollability" in the training space. They used a two-dimensional model to represent the parameters of instrumental training, one dimension representing the conditional probability of a reinforcer following a response, and the other representing the conditional probability of a reinforcer occuring in the absence of that response. It was assumed that a subject is sensitive to variations along both dimensions conjointly. "Controllability" exists when the two above-mentioned conditional probabilities are not equal, that is, a subject can respond or not respond to change the reinforcer outcome. "Uncontrollability" exists when the conditional probabilities are equal, that is, whether a subject responds or not cannot change the reinforcer outcome. In both cases, learning is involved; a subject learns that its response controls the reinforcer or that its response does not control the reinforcer. The latter is a special condition in instrumental training that provides the learning basis for the condition of "learned helplessness".

Seligman et al. (1971) further reviewed the animal literature on uncontrollable aversive events. In almost all cases such aversive or traumatic events were electric shocks. The basic experimental manipulation was first exposing a naive subject to inescapable and unavoidable shock and then putting it in a situation where escape and/or avoidance was possible. Experiments of this type differed in the setting of the inescapable shock, the time interval between the shock and subsequent training, the topography of the escape/avoidance responses, and the species of subjects. But the most important variable seemed to be the type of instrumental escape/avoidance training procedure used following exposure to uncontrollable shock. In other words, how uncontrollable shocks affect the subsequent acquisition of responses that control shock depends on the kind of response a subject must make in order to control shock. Four kinds of escape/avoidance responding were identified: (a) two-way shuttlebox, (b) manipulandum, (c) one-way shuttlebox, and (d) passive avoidance. The first three kinds are all active avoidance test situations in which a subject makes some designated response to escape or avoid; while the last kind is passive in which a subject is required to refrain from making some designated response. The two-way shuttlebox was used in the two paradigmatic studies of Overmier and Seligman (1967) and Seligman and Maier (1967). Shocks could occur in either compartment, so there was no place that was always safe, but the response of shuttling or jumping over the dividing hurdle always led to safety. Manipulandum escape/avoidance was employed, for example, by Dinsmoor and Campbell (1956a, b). A subject had to move some part of its environment (e.g., bar-pressing, wheel-turning) to escape or avoid. The one-way shuttlebox was used, for example, by De Toledo and Black (1967). The "start" side of the box was always dangerous, and shuttling to the other compartment could terminate the shock. Finally, passive avoidance procedures were employed by, for example, Anderson, Cole, and McVaugh (1968). Typically, the response punished by shock was maintained by reward, e.g., pressing a bar to get food; and shock could be avoided by not making the response, e.g., not pressing the bar. Seligman et al.'s (1971) review found that in both two-way shuttlebox and manipulandum escape/avoidance situations the acquisition of the operant was retarded by prior experience of uncontrollable shock. For one-way shuttlebox, escape/avoidance situation the acquisition of operant was retarded only if the shocks were given in the to-be-safe goalbox, but slightly facilitated or not affected if the shocks were administered in the to-be-dangerous start box or in a different apparatus. Finally, passive avoidance learning seemed to be facilitated by prior uncontrollable shock.

Seligman et al. (1971) then presented arguments to support the adequacy of their "learned helplessness" hypothesis to account for research findings. Basically, the hypothesis postulates that the learning of the response-independence of shock reduces the incentive for initiating active instrumental responses in a situation where shock is response-dependent. The "helplessness" expectation is generalized to other shock situations. In addition, having learned "to be helpless" interferes with subsequent learning of "not to be helpless". The authors described how the learned helplessness hypothesis could account for an impaired learning in the two-way shuttlebox, one-way shuttlebox, manipulandum and passive avoidance situations:

> Uncontrollable shocks reduce the incentive for attempting active instrumental responses. Manipulandum and two-way shuttlebox escape/avoidance require active instrumental responses and so should be retarded. Passive avoidance required the suppression of such responding and so could be facilitated.... In one-way avoidance training, shocks only occur in one compartment of the apparatus; one side is dangerous and the other safe. In order to learn one-way avoidance, *S* must merely acquire conditioned fear of one compartment of the apparatus but not of the other. Once this stimulus conditioning has occurred, *S*'s problem is solved: it does not have to *learn* to flee from a dangerous to a safe when both are in view. According to this interpretation, *one-way avoidance learning is not response learning. It is place learning. Running from a dangerous place to a safe place may be an innate response*, ... the helplessness hypothesis deduces the absence of interference.... if active instrumental acts are not involved, no effect should be found. (pp. 369-370)

Seligman et al. (1971) further pointed out that besides explaining the obtained effects of preshock, three types of predictions generated by the learned helplessness hypothesis were confirmed. First, by means of a yoked design, they demonstrated that it was the lack of controllability over the aversive stimulus, not the stimulus itself, that caused interference. The Seligman and Maier (1967) study reviewed earlier is such a study. The inescapable-shock group, yoked to and therefore received the same shocks as the escapable-shock group, showed interference. The escapable-shock and the naive control groups both exhibited no deficit in escape/avoidance performance. Another study (Maier, 1970) demonstrated even more clearly that the competing motor response fear-freezing hypothesis is untenable. After training dogs to passively escape shocks, i.e., by not moving their heads in the harness to terminate shocks, Maier found that these dogs behaved similarly to the naive control group, while the yoked inescapable-shock group showed deficit. Since remaining passive and still is antagonistic to barrier jumping, the fear-freezing hypothesis would predict that the passive escape group would show subsequent instrumental learning deficit. On the other hand, the learned helplessness hypothesis would predict the absence of learning deficit, because it is not the type of motor responses but the response-dependence or controllability of shocks that matters.

Second, the learned helplessness hypothesis predicts that immunization procedures would prevent inescapable-shock subjects from subsequent deficit in escape/avoidance learning. Seligman and Maier (1967) gave some dogs escape/avoidance training before administering uncontrollable-inescapable shocks, and found that such dogs were not affected by the interfering effects of uncontrollable shocks. Supporting evidences could further be classified into two categories: (a) subjects partially trained, and therefore do not have good control over shocks sometimes showed the interference effects of inescapable shocks, (e.g., Anderson & Nakamura, 1964; Hearst & Whelan, 1963); and (b) the performance of subjects well-trained in an escape/avoidance response were enhanced by exposure to inescapable shocks in the same training situation (e.g., Baum, 1965; Kelleher, Riddle, & Cook, 1963; Sidman, Hernstein, & Conrad, 1957; Waller & Waller, 1963).

Third, the learned helplessness hypothesis predicts that therapy procedures would reverse the interference effects of inescapable shocks. Seligman, Maier, and Geer (1968) successfully alleviated learned helplessness in dogs. The subjects were forcibly pulled from one side of the shuttle box to the other to terminate the shock. After 20 to 50 exposures to such escape/avoidance contingency, the subjects started to respond spontaneously and jumped the barrier successfully.

In their most recent review, Maier and Seligman (1976) described helplessness in terms of the following deficits:

> a) The motivation to respond in the face of later aversive events seems to wane. b) Moreover, even if the subject does respond and the response succeeds in producing relief, the subject often has difficulty learning that the response worked. c) Finally, emotional balance may be distributed; depression and anxiety, measured in a variety of ways, may predominate. (p.7)

However, available empirical data typically did not differentiate between these aspects of deficit. Thus this review will treat them as aspects of an unitary learned helplessness syndrome.

When faced with uncontrollability, several animal species, including dogs, cats, goldfish, rats and mice, exhibited learned helplessness. Data for dogs were all from the studies of Seligman and his collaborators. These included the two paradigmatic studies (Overmier & Seligman, 1967; Seligman & Maier, 1967), and three other reports (Overmier, 1968; Seligman & Groves, 1970; Seligman, Maier, & Geer, 1968). The learned helplessness effect was obtained quite readily, whether the inescapable shock was or was not signalled, whether pre-shocked and tested in hammock or shuttle box, and whether, within limits, shock parameters were varied. However, not all dog subjects which received inescapable preshock showed motivational deficits (about 33% of the shocked subjects did not), and not all naive non-shocked subjects were normal efficient responders (about 5% failed to learn without exposure to inescapable preshock). It is likely, as Maier and Seligman believe, that the natural experience of the dog subjects before they arrived at the laboratory may affect their behavior in the experiments; some inescapably shocked subjects may have already been immunized against helplessness, while so-called naive subjects may have already acquired helplessness.

Debilitation of response initiation in cats as a consequence of uncontrollable outcomes were reported in studies like Masserman (1971), Seward and Humphrey (1967), Thomas and Balter (Maier & Seligman, 1976), and Zielinski and Soltysik (1964). It should be noted, however, that most of these studies were not designed specifically to test the learned helplessness hypothesis, and therefore did not employ the so-called triadic yoked-unyoked design to show that it was controllability of shock delivered during pretreatment and not shock per se that caused interference in escape/avoidance learning. Only the Thomas and Balter study appeared to use a hammock and a shuttle box similar to Seligman's dog studies. Moreover, some of the studies quoted by Maier and Seligman (1976) as supporting evidences for learned helplessness involve a signal preceding the inescapable shock. As Levis (1976) pointed out:

> If a signal is permitted to be introduced into the context of a learned helplessness paradigm, then this reviewer has difficulty discriminating procedurally between a learned helplessness procedure and a classical conditioning fear procedure where the reinforcement is also programmed independent of the subject's responding.... the classical fear conditioning procedure is frequently followed by an increment in instrumental responding rather than a decrement. That is to say, when provided an opportunity, the animal learns to leave the apparatus in which inescapable shocks were previously administered. (p. 52)

Thus, if the learned helplessness paradigm is to remain procedurally distinct, and inferences drawn from studies involving inescapable shock are to be clear, then experiments procedurally similar to classical fear conditioning should not be included in the apparently volumous literature supporting learned helplessness. For example, the Seward and Humphrey (1967) and the Zielinski and Soltysik (1964) studies both examined avoidance learning as a function of pretraining in cats. The former study found that their classically conditioned group (buzzes paired with inescapable shocks) reached avoidance learning criterion in fewer trials than the instrumentally conditioned group (shock terminated by pawing a wheel), whereas the latter study found the opposite. Both studies were cited by Maier and Seligman (1976) as examples of learned helplessness caused by inescapable shock. Therefore, experiments not designed to study the controllability of shock and especially those using a classical fear conditioning procedure are merely loosely related to, and at best marginally supportive of the learned helplessness hypothesis. This criticism is applicable not only to the studies using cats as subjects but also to studies using other species cited by Maier and Seligman in their 1976 review.

For goldfish, deficit was shown by Padilla, Padilla, Ketterer, and Giacolone (1970) using an aquatic shuttle box. Maier and Seligman also referred to other goldfish data collected by Behrend and Bitterman (1967), Bintz (1971), Frumkin and Brookshire (1969), and Padilla (1973). Of these, the most relevant seems to be the study of Padilla (1973), which compared prior or interpolated unsignalled inescapable shocks with prior or interpolated CS-omission escape training. Response initiation deficit was found in exposures to both prior and interpolated unsignalled inescapable shocks, but only in prior CS-omission escape training. The author concluded that these data extended the phenomena of learned helplessness to the case where inescapable shocks are placed between two escape-avoidance learning blocks, and that the CS-omission given prior to escape-avoidance training produced a behavioral condition similar to that of learned helplessness. However, the interpolation of inescapable shocks between two escape-avoidance learning sessions is quite similar to the immunization procedure used in Seligman and Maier's (1967) dog study. If so conceived, then the failure of "immunization" provided in Padilla's study is in conflict with the success found in Seligman and Maier's study. Although such a conflict may be resolved by the difference in intersession interval (five minutes versus 24 hours) and in location of inescapable shock (same apparatus for goldfish; harness for shock and shuttle box for learning for dog), the claim by Padilla for his findings as exemplifying learned helplessness is rather weak.

For rats, relatively earlier studies typically found little or no learned helplessness effect (Anderson, Cole, & McVaugh, 1968; de Toledo & Black, 1967; Mullin & Mogensen, 1963; Weiss, Krieckhaus, & Conte, 1968). Having received inescapable shocks, a rat did not fail to learn escape/avoidance, but was merely slower to acquire the escape/avoidance responses. More recent studies (Maier, Albin, & Testa, 1973; Maier & Testa, 1975; Seligman & Beagley, 1975; Seligman, Rosellini, & Kozak, 1975) found that only when rats were required to carry out more difficult responses to escape or avoid would escape/avoidance learning failures occur. For instance, a rat had to run across the shuttle box and back (FR-2 shuttling) instead of just running to the other end of the shuttle box (FR-1 shuttling); or it had to press a bar three times to terminate shock (FR-3 bar pressing) instead of pressing just twice or once (FR-2 or FR-1 bar pressing). In other words, in two-way shuttle box or jump-up escape, rats exposed to inescapable shock would fail to learn to escape if the escape response was one that was acquired more gradually. As Maier, Albin, and Testa (1973) pointed out, before their experiment, the only two published reports of a large interference effect in rats were Dinsmoor & Campbell's (1956a) study using a lever-press escape response, and Looney and Cohen's (1972) study using a jump-up escape, and both escape responses involved a learning curve in naive rats.

However, unlike the dog experiments which gave inescapable shocks in a harness and tested for escape-avoidance learning in a shuttle box, these two studies with rats administered both treatment and testing in the same apparatus. Thus there remained the possibility that interference found in rats might not be transituational. Maier, Albin, and Testa's (1973) experiments clarified the earlier mixed findings not only by showing the important relation between the type of escape-avoidance response and the magnitude of learning interference, but also by showing the transsituational character of such an interference. Additional research with rats by Seligman and Beagley (1975) confirmed the necessity to find a response sensitive enough to measure the decremental effects of inescapable shock on later escape. The dog-like learned helplessness effect was demonstrated when FR-3 bar-pressing was required. Mere jump-up, FR-1, and FR-2 press conditions were not able to differentiate the inescapable shock and the no shock groups. Of importance is the inclusion of a yoked inescapably shocked group to show, as in the dog experiments, that it is controllability, not shock itself, that brings about the helpless effect. Most earlier studies, including the Looney and Cohen (1972) study which found interference, did not have the yoked control group, and were therefore ambiguous. In sum, it appears that the helplessness interference effect is not found in reflex and high-probability responses, but instead in clearly voluntary or instrumental responses.

In a series of experiments, Seligman, Rosellini, and Kozak (1975) investigated the time course, immunization, and reversibility aspects of learned helplessness in rats. Failure to escape following exposure to inescapable shock did not dissipate at various time intervals up to one week. This was similar to cage-reared dogs (Seligman & Groves, 1970), but different from non-cage-reared dogs (Overmier, 1968; Overmier & Seligman, 1967). Apparently, both cage-reared dogs and rats were relatively deprived of natural escape experience, and consequently were more vulnerable to nondissipating learned helplessness. Non-cage-reared dogs of unknown prelaboratory history might have been immunized because of their experience in escape from natural aversive events. In a second experiment, Seligman et al.

attempted to immunize rats against learned helplessness by providing training to escape from shock by a jumping response before exposing them to inescapable shock and testing them in a bar press escape situation. Despite the difference between the original and the subsequent escape responses, immunized rats did not become helpless. Such a result parallels the immunization findings in dogs (Seligman & Maier, 1967). Further in a third experiment, Seligman et al. successfully reversed the helpless behavior of rats by forcibly exposing them to the response-shock-termination contingency. This result parallels the alleviation of helplessness in the dog (Seligman, Maier, Geer, 1968). In conclusion, there are a number of agreements between the findings in the rat and in the dog, the two species in which various aspects of learned helplessness have most thoroughly been investigated:

> (a) Like dogs, rats receiving inescapable shock fail to escape later on. (b) Like dogs, rats receiving inescapable shock sometimes respond successfully during escapable shock but revert to passively taking the shock. (c) Like dogs, yoked rats receiving identical escapable shocks do not become helpless.... (d) Like cage-reared dogs, cage-reared rats show failure to escape that does not dissipate in time; (e) Like dogs, rats receiving prior escapable shock are immunized against becoming helpless when faced with inescapable shock; and (f) Like dogs, rats given forced exposure to the response-shock-termination contingency learn to escape on their own. (Seligman, Rosellini, & Kozak, 1975, pp. 546-547)

In addition, for rats, there are some developmental data regarding the retention and immunization of learned helplessness. Hannum, Rosellini, and Seligman (1976) found that helplessness learned by weanlings was retained and interfered with adaptive instrumental responding in adulthood, and that immunization in the form of experience with escapable shock given in the weanling stage protected against the deficits produced by inescapable shock received in adulthood. These longitudinal studies were consistent with the time course and immunization findings for adult rats in Seligman, Rosellini, and Kozak's (1975) study.

<u>Summary of animal studies</u>. The induction of learned helplessness has been demonstrated quite consistently in animal studies. The species examined included dogs, cats, goldfish, and rats. Studies on dogs and rats were especially thorough because they involved the immunization and reversal as well as the induction of learned helplessness. Some longitudinal developmental data were also obtained for rats. As presented in the reviews of the proponents (Maier & Seligman, 1976; Seligman, Maier, & Soloman, 1971) and their critic (Levis, 1976), the bulk of data appears to support the cognitive explanation of the learned helplessness phenomenon.

Human Studies on Learned Helplessness

Since learned helplessness is a cognitive hypothesis well-supported in animal studies, it is a logical step to see if it is applicable to human beings. Since 1971, there have been more than 20 studies which attempted to extend the learned helplessness phenomenon to human subjects. Earlier studies involved primarily the induction and generalization of learned helplessness; while more recent studies examined the immunization and reversal aspects of the phenomenon. Table 1 summarizes, in chronological and alphabetical order, the design and results of human studies on learned helplessness. In this table, the type, number, and classification of subjects will first be outlined, together with a note of whether the "yoked" design was used. Second, the nature of the task employed to induce learned helplessness will be described. Third, the nature and dependent measures of the test task will be presented. Finally, a summary statement regarding the degree of support for learned helplessness will be given.

Basically, the logic of the experiments adopted from the animal studies was consistent and the emphasis was on the induction of learned helplessness. Some experiments examined the immunization and reversal of learned helplessness. Success in immunization or reversal implied success in induction, but not vice versa. To decide whether an experiment supported the learned helplessness hypothesis, some overall evaluation of an experiment must be made concerning the degree of success in laboratory induction. Since there were differing degrees

Table 1

Human Studies on Learned Helplessness

Study	Subject group	Induction task	Test task	Dependent measure[a]	Result[b]
Fosco & Geer (1971)	60 college students in 4 groups (4 levels of problem insolubility). Not yoked.	Insoluble problems in 96 trials of task to find out the sequence of button presses.	Integrated with the induction task, i.e., the last part of the 96 trials.	No. of errors in last 3 trials. Response latency. (Galvanic skin response)	Partial support for LH. (Only 1 measure showed significance)
Thornton & Jacobs (1971)	80 college students in 8 groups (2 stress-set instructions by 4 shock contingencies). Yoked.	Inescapable shock in 30 trials of choice reaction time task.	10 trials of unspecified choice reaction time task.	Response latency. (Perceived stress index)	Partial support for LH. (Confounded by difference in pretreatment instructions)
Glass & Singer (1972)	(a) 20 college students in 4 groups (Perceived or no perceived avoidance; soluble or insoluble control). Not yoked.	Inescapable noise in 18 trials of graphic puzzles.	Stroop Color Word Test. Proofreading.	Speed of color word naming. Proofreading errors. (Galvanic skin response)	Support for LH.

[a]Dependent measures not directly related to test tasks are put in parentheses.
[b]LH = Learned helplessness.

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
	(b) 66 college students in 6 groups (2 levels of shock predictability by 2 levels of perceived avoidance plus 2 control groups) Additional 11 college students to form another experimental group for cross-validation. Not yoked.	Inescapable shock in 18 trials of graphic puzzles.	Stroop Color Word Test. Proofreading.	Same as (a) above, plus percentage of proofreading errors, & time spent in solving the final puzzle. (Galvanic skin response)	Support for LH.
	(c) 72 college students in 3 groups (Personally responsible; no harassment; regulation responsible). Not yoked.	Inescapable social stressor during bureaucratic interaction.	*Proofreading.* *Orne's "demand* characteristics" task. Bargaining task.	*Percentage of* errors missed in proofing. No. of subjects using each mode of response in Orne's task. Lost bids in bargaining.	*Partial* support for LH. (*Facilitative* effects were also found.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Thornton & Jacobs (1972)	(a) 48 college students in 3 groups (3 levels of escapability). Yoked.	Inescapable shock in 30 trials of button-pressing choice reaction time task.	Wonderlic Personnel Test (Mathematics, verbal reasoning, perceptual organization).	Wonderlic test scores.	No support for LH. (Facilitative effects found, but confounded by group difference in Wonderlic pretest scores.)
	(b) 27 college students in 3 groups (3 levels of escapability). Yoked.	Same as (a).	Same as (a).	Same as (a).	No support for LH confirmed. (Facilitative effects found after group Wonderlic pretest scores were matched.)
Dweck & Reppucci (1973)	40 fifth-grade students in 4 groups (2 sexes by 2 levels of helplessness, determined on the basis of task performance). Not yoked.	The induction and test tasks were intermingled. Success or failure experience was provided by soluble or insoluble block design problems. There were altogether 30 failure trials, 26 success trials, 4 probe problems to assess fatigue or practice effect, and 4 test problems.		Time to solve problems. (Intellectual Achievement Responsibility Scale scores.)	Partial support for LH. (The emphasis was on "helpless" subjects' attributing uncontrollability to their inability to avoid failure in an achievement situation rather than Seligman's emphasis on learning the independence between response & outcome.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Hiroto (1974)	96 college students in 12 groups (3 levels of escapability by 2 levels of instrumental set by 2 levels of locus of control). Not yoked.	30 unsignalled trials of inescapable aversive noise.	18 trials of human 2-way shuttlebox.	Trials to criterion for avoidance acquisition. Trials to criterion for escape acquisition. No. of avoidance responses. No. of failures to escape. Response latency.	Partial support for LH. (Externality, perceptual set of chance, as well as inescapability also led to "helplessness".)
Krantz, Glass, & Snyder (1974)	(a) 60 college students in 4 groups (2 levels of escapability by 2 levels of noise). Yoked.	35 trials of unsignalled inescapable aversive noise.	18 trials of human 2-way shuttlebox.	Escape response latency. Trials to criterion for escape or avoidance acquisition. No. of escapes and avoidances. No. of escapes. No. of avoidance responses. (Jenkins Activity Survey for Health Prediction Test scores; Palmar skin conductance.)	Support for LH. (Increased amount of helplessness training increased manifestation of helplessness.)
	(b) 24 college students in 2 groups (2 levels of escapability). Yoked.	Same as (a).	Same as (a).		

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Roth & Bootzin (1974)	28 college students in 4 groups (3 levels of "helplessness" training: no, single, double; plus no-treatment control). Not yoked.	Noncontingent, random reinforcement for performance on 3 concept formation tasks, with 8, 150, & 144 trials respectively.)	81 trials of concept formation task.	Percentage of subjects standing up one or more times to blurred images of stimulus cards. Standing up latency. Length of time spent in test task. No. of trials to criterion.	No support for LH. (Facilitative effects found; curvilinear relationship between amount of "helplessness" training and behavioral manifestation of "helplessness" suggested.)
Thornton & Powell (1974)	(a) 32 college students in 4 groups (Avoidable shock; Unavoidable shock; immunization; & control). Yoked.	Unavoidable shock in 60 trials of choice reaction time task; immunization group received 30 avoidable & then 30 unavoidable shocks.	Choice reaction time problem solving.	Reaction times over blocks of trials.	Support for LH induction, but not for LH immunization.

Table 1 *(Continued)*

Study	Subject group	Induction task	Test task	Dependent measure	Result
	(b) 80 college students in 10 groups (3 test task delay intervals by 3 levels of avoidability plus 1 alleviation group). Yoked.	Same as (a).	Same as (a).	Same as (a).	Support for LH. (Effect lasted up to 24 hours; alleviation of LH found.)
	(c) 40 college students in 5 groups (Avoidable or unavoidable shock, plus 3 control groups differing in types of instruction). Yoked.	Same as (a).	Same as (a).	Same as (a).	Control groups in (a) & (b) above were not free from stress on induction task, and therefore might not be adequate. (They knew shock was involved and therefore in stress.)
Douglas & Anisman (1975)	(a) 24 college students in 3 groups (Soluble, insoluble control). Not yoked.	Insoluble problems in 20 trials of key-light pairing task.	20 trials of key-light pairing task.	No. of correct responses. Response latency.	Support for LH. (Similar induction and test task.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
	(b) 40 college students in 5 groups (2 levels of solubility by 2 levels of task complexity, plus 1 control). Not yoked.	Same as (a).	10 trials of paper maze task.	No. of errors. Response latency. Time spent to complete task.	Partial support for LH. (Effect not found if induction task was complex. Generalization to dissimilar task if induction was simple.)
	(c) 32 college students in 4 groups (2 immunization tasks, no immunization control, no treatment control. Not yoked.	Soluble key-light pairing of paper maze task, and then insoluble key-light pairing task.	20 trials of key-light pairing task.	Same as (a).	Support for LH immunization. (Effect found whether immunization task was similar or dissimilar to induction task.)
Hiroto & Seligman (1975)	(a) 24 college students in 3 groups (Escapable, inescapable, control). Yoked.	45 unsignalled trials of inescapable aversive noise (Instrumental task).	20 signalled human shuttle box trials. (Instrumental task.)	Trials to criterion for excape acquisition. No. of failures to escape. Response latency.	Support for LH.

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
	(b) 24 college students in 3 groups (Soluble, insoluble, control). Yoked.	Insoluble problems in 30 trials of Levine-type discrimination task. (Cognitive task).	20 signalled human shuttle box trials. (Instrumental task).	Same as (a).	Support for LH
	(c) Same as (a).	Same as (a). (Instrumental task).	20 trials of anagram problems (Cognitive task).	Trials to criterion for solution. No. of failures to solve. Response latency.	Support for LH.
	(d) Same as (b).	Same as (b). (Cognitive task).	Same as (c). (Cognitive task).	Same as (c).	No support for LH (Trend only.)
Roth & Kubal (1975)	63 college students in 7 groups (3 levels of helplessness training by 2 levels of task importance plus 1 notreatment control). Not yoked.	Noncontingent, random reinforcement in 50 to 120 trials of concept formation problems.	Up to 150 trials of concept formation problems.	No. of problems solved. No. of trials to criterion. No. of correct choices before criterion is reached. No. of times a new puzzle is requested. Persistence based on trial no. & on 1st of 5 puzzles.	Partial support for LH. (Facilitative effects were also found; curvilinear relationship supported; greater task importance & more amount of induction increased LH.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Benson & Kennelly (1976)	100 college students in 4 groups (Soluble, insoluble-aversive, always correct, control). Not yoked.	Noncontingent reinforcement or incorrect feedback in 5 trials of Levine-type discrimination problems.	20 trials of anagram problems	Trials to criterion. Response latency. No. of failures.	Partial support for LH. (Uncontrollable aversive outcome, not uncontrollable reinforcements, produced LH; controllable aversive outcome produced learned "competence.")
Cohen, Rothbart, & Phillips (1976)	42 college students in 4 groups (2 locus of control levels by 2 reinforcement contingency levels).	Noncontingent reinforcement in up to 200 trials of concept formation task.	Stroop Color-Word Test (Non-problem-solving task). Feather-type diagram tracing task (Problem-solving task).	For Stroop Test: time to read words; time to name colors; time to name colors with wrong labels. For diagram tracing: time spent in solvable and insolvable items.	Support for LH. (Both internal & external non-contingent subjects showed LH on problem-solving task; only externals showed LH on non-problem-solving task.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Gatchel & Proctor (1976)	48 college students in 3 groups (Inescapable, escapable, control). Yoked.	45 unsignalled trials of inescapable aversive noise.	20 trials of anagram problems.	Response latency. No. of failures. Trials to criterion. (Phasic skin response, tonic skin response, tonic heart rate)	Support for LH. (Physiological measures suggest possible relation of LH with depression.)
Wortman, Panciera, Shusterman, (1976)	42 college students in 4 groups (3 types of no perceived controls: incompetence, no information, situation, plus 1 perceived control group). Not yoked.	Noncontingent reinforcement in 12 trials of Thurstone's Concealed Figures Test.	9 trials of line tracing puzzles.	No. of puzzles solved.	Partial support for LH. (Uncontrollable aversive stimulation per se was not sufficient to produce LH; rather, LH is a function of the attribution of causality that one makes for failure to exert control; curvilinear relation between perceived "competence" and subsequent performance suggested.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Cole & Coyne (1977)	80 college students in 4 groups (2 escapability levels by 2 setting similarity levels). Yoked.	45 trials of unsignalled inescapable aversive noise.	20 trials of anagram problems.	No. of failures. Trials to criterion. Response latency. (MAACL measures of depression, hostility, & anxiety moods.)	Partial support for LH. (Only found in setting similar to that where induction was given; no change of mood; situationally specific events may be important.)
Jones, Nation, & Massad (1977)	(a) 32 college students in 4 groups (3 levels of reinforcement plus immunization, 1 no-immunization control group). Not yoked.	0, 50, or 100% of reinforcement on insoluble problems in 4 Levine-type discrimination problems each with 10 trials (Immunization phase) followed by insoluble problems in another 4 Levine-type discrimination problems each with 10 trials (Induction phase).	20 trials of signalled human shuttle box.	Response latency. No. of failures to escape. Trials to criterion.	Partial support for LH. (Immunization found in only 50% reinforcement group.)
	(b) 40 college students in 5 groups (3 immunization groups as above, 1 soluble control & 1 no-treatment control). Yoked.		20 trials of anagram problems.	Response latency. No. of failures to solve. Trials to criterion.	Same as (a). (Support for stimulus-response explanation of the phenomenon.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Tennen & Eller (1977)	49 college students in 5 groups (3 levels of helpless training, contingent reinforcement control, no-treatment control). Not yoked.	Noncontingent reinforcement in 48 trials of Levine-type discrimination problems.	20 trials of anagram problems.	No. of correct responses. Response latency. Trials to criterion.	Partial support for LH. (Amount of LH training not sufficient; rather, both amount of LH training and availability of attributional cues were responsible.)
Peterson (1978)	(a) 64 college students in 8 groups (4 pretreatment levels by 2 test condition levels). Not yoked.	Random-sequence insoluble problems in 4 sets of concept formation task.	5 concept formation problems with up to 24 trials each.	Trials to criterion.	No support for LH. (Impairment following insolubility was inversely proportional to test task difficulty; may be explained by hypothesis pool alteration in the direction of inappropriately complex hypotheses.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
	(b) 24 college students in 4 groups (2 pretreatment levels: random, none; by 2 test condition levels: attribute, sequence). Not yoked.	Same as (a).	Same as (a).	Same as (a).	Support for LH. (Procedure used to facilitate the attribution of response-outcome independence; impairment following insolubility was directly proportional to test difficulty.)
Klee & Meyer (1979)	An undisclosed no. of subjects in 4 groups (Immunization with positive or negative feedback, no immunization control, no treatment control). Not yoked.	Thermal biofeedback training with correct or incorrect feedback as strong controlling type of immunization experience, followed by inescapable aversive noise as helplessness induction. (No. of trials was not reported.)	Escape-avoidance learning of aversive noise. (No. of trials was not reported.)	Trials to criterion for avoidance acquisition. Trials to criterion for escape acquisition. Response latency. No. of failures to respond.	Support for LH immunization.

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
Lavelle, Metalsky, & Coyne (1979)	72 college students in 8 groups (2 levels of test anxiety by 2 levels of controllability by 2 levels of acknowledgement of contingency). Yoked.	45 trials of unsignalled inescapable aversive noise.	20 trials anagram problems.	Trials to criterion. No. of failures. Response latency. (Unipolar adjective rating.)	Partial support for LH. (Only high test-anxious subjects showed LH; may be explained by test anxiety theory. Subjects who did not have control felt less competent, stronger, more successful, happier, & more frustrated than subject who had control.)
Sergent & Lambert (1979)	(a) 38 college students in 5 groups (2 levels of locus of control, by 2 levels of contingency, plus 1 control). Yoked.	Noncontingent reinforcement in up to more than 80 trials of concept formation task. (Termination criterion was 20 successive correct responses.)	Stroop Color-Word Test. (Presented as an independent experiment.)	Time & no. of errors to read color names, to name ink colors, & to name ink colors with wrong labels.	Partial support for LH. (Both internals & externals showed LH in no.-of-errors measures only.)

Table 1 (Continued)

Study	Subject group	Induction task	Test task	Dependent measure	Result
	(b) 42 college students in 4 groups as in (a), plus 10 subjects of the same control group from (a). 2 levels of success vs. failure were formed retrospectively to form 8 groups.	Noncontingent reinforcement in 60 trials of Revised Minnesota Paper Form Board Test, a spatial reasoning task.	Same as (a).	Same as (a).	No support for for LH. (By dissociating contingency from success & noncontingency from failure, contingency-noncontingency factor was not necessary or sufficient in non-problem-solving task.

of details reported, some subjectivity was involved in making intra- and inter-experiment comparisons. Several areas of the experiments were examined. First, the number of dependent measures that yielded statistical significant or nonsignificant findings were ascertained, with due consideration for the interdependence of certain measures and their relative importance. Second, attempt was made to find out if there was possible confounding of variables that might weaken the significance of results. Third, the direction of prediction was examined (e.g., facilitative effects and curvilinear relationships were not predicted by learned helplessness). Fourth, the other variables included in the experimental design were assessed with regard to their contribution to the resulting helplessness effect, (e.g., external locus of control, task complexity, amount of pretreatment, and setting of pretreatment).

The 23 studies summarized in Table 1 included 37 experiments. Except for one (Dweck & Reppucci, 1973) which used fifth-grade students, all experiments employed college students as subjects. The common design in animal studies of yoking the inescapable group to the escapable group was found in half of the experiments. For the induction of learned helplessness, 50% of the experiments involved insoluble problems in the induction task, 26% inescapable aversive noise, 21% inescapable aversive shock, and 1 experiment used inescapable social stress. Unlike the almost exclusive use of the inescapability of shock in animal studies, the tendency in human studies was to use the cognitive analogue of the insoluble problems to induce learned helplessness. Similarly, the human analogue of the instrumental two-way shuttle box so common in animal studies was found in only 16% of the test tasks. Cognitive test tasks were found in the remaining 84%: 37% used simpler problems like choice reaction time, color-naming, and proofreading; and 47% used more complicated problems like verbal reasoning, concept formation, anagrams, and perceptual organization. As for dependent measures, about 43% were a direct measure of time, such as response latency, or time spent to complete a problem. The other 57% involved untimed measure, such as number of errors or successes, and number of trials to criterion, and measures that might be indirectly a function of time, e.g., defining a failure as a trial with a latency of 100 seconds or the criterion of success as three consecutive solutions in less than 15 seconds each.

Finally, the results of the studies were classified into three categories regarding their support for the learned helplessness hypothesis: 41% of the experiments gave support for the hypothesis, 43% partial support, and 16% no support.

In summary, the support for laboratory induction of the learned helplessness phenomenon in humans is lesser than that found in animal studies. But the support is still convincing, if one considers the variation of subject samples, induction tasks, test tasks, and dependent measures employed.

Studies Attempting to Relate Learned Helplessness with Depression

Seligman (1972, 1974, 1975) proposed that learned helplessness in animals and man may serve as a model of reactive depression. He suggested five lines of similarity: symptoms, etiology, physiological concomitants, cure, and prevention. Of these, symptoms and etiology have received most attention in speculation and research. The symptoms common to learned helplessness and depression Seligman pointed out are listed in Table 2. Further, in terms of etiology, Seligman suggested that learning that responding and reinforcement are independent found in learned helplessness is similar to the belief of depressed patients that striving to obtain reinforcement is futile. Thus, both symptomatically and etiologically, the perception of reinforcement as response independent is of primary importance. Depression, therefore, is seen as a specific cognitive distortion of the perception of the ability of one's own responses to change the environment. If learned helplessness is a valid model of depression, then depressives should tend to view reinforcement as response independent.

Miller and Seligman (1973) conducted an experiment to examine the crucial relationship between depression and the perception of reinforcement. Using skill determined (response dependent) and chance determined (response independent) tasks originally used by Rotter (Rotter, Liverant, & Crowne, 1961), Miller and Seligman attempted to test the hypothesized differential perception of reinforcement by the

Table 2

Symptoms Common to Learned Helplessness and Depression

Learned helplessness	Depression
1. Difficulty learning that responses produce relief	Negative cognitive set
2. Passivity	Passivity
3. Lack of aggression	Introjected hostility
4. Weight loss, appetite loss, social and sexual deficits	Weight loss, appetite loss, social and sexual deficits
5. Dissipates in time	Time course

depressed and the nondepressed. The two main predictions were:

1. In skill tasks, depressed subjects should perceive reinforcement as more response independent than nondepressed subjects, and the depressed should, therefore, show less change in expectancy following reinforcement in the skill task than the nondepressed.

2. In chance task, both depressed and nondepressed subjects should perceive reinforcement as response independent, and they should not differ on change in expectancy following reinforcement.

The additional predictions were:

1. Nondepressed subjects should tend to perceive accurately the relationship between reinforcement and responding, and should, therefore, show more change in expectancy following reinforcement in the skill task than in the chance task.

2. Depressed subjects should have less difference in expectancy change between skill and chance tasks than nondepressed subjects.

3. In skill task, the intensity of depression should be negatively correlated with the amount of expectancy change.

4. In chance task, the intensity of depression should be uncorrelated with the amount of expectancy change.

Further, Rotter's (1966) concept of external and internal locus of control was incorporated into the study. There seems to be a similarity between the learned helplessness concept of response independence and Rotter's concept of external control. Thus, if the high-external subjects tend to perceive reinforcement as determined more by external factors than themselves, they should show less expectancy change in both skill and chance tasks than the high-internal subjects.

Changes in verbalized expectancies for success following reinforcement in skill and chance tasks were examined in 32 college students in four groups -- depressed high-external, depressed low-external, nondepressed high-external, and nondepressed low-external. According to the authors, the predictions were confirmed: nondepressed subjects showed greater expectancy changes than depressed subjects in skill task, while the changes of the depressed and nondepressed subjects were similar in chance task. Externality had no significant effect on expectancy changes in both types of task. Seligman interpreted the results as indicating that depression entails a specific cognitive distortion of the perceived consequences of skilled actions, and suggested that a significant behavioral manifestation of depression is learned helplessness -- the expectancy that responding and reinforcement are independent.

As a paradigmatic study (Miller & Seligman, 1973) examined a set of predictions regarding the similarity of behavioral symptoms of depression and learned helplessness. Since then, more than 15 studies have attempted to relate learned helplessness with depression. Table 3a summarizes, in chronological and alphabetical order, the design and results of those studies using nonclinically depressed subjects; and Table 3b summarizes similarly those studies using clinically depressed

Table 3a

Studies on Depression and Learned Helplessness

Using Nonclinically Depressed Subjects

Study	Subject group	Inducement &/or test task	Dependent measure	Result[a]
Miller & Seligman (1973)	32 college students in 4 groups (2 levels of depression by 2 levels of locus of control). Age, IQ, education not reported. BDI ≥ 9 means depressed.	Chance task: Guessing "X" or "O" slides. Skill task: Raising a bearing on a platform to specified height.	Change in expectancy from Trial 1 to Trial 2. Expectancy after final trial. Total amount of expectancy change in appropriate directions.	Partial support for LH/depression. (Depression and nondepression groups did not differ in skill task total expectancy change, but in the other two dependent measures. Depression by Tasks interaction was not significant for Trial 1 to Trial 2 expectancy change, but significant for the other two measures. Depression & nondepression groups did not differ in chance task expectancy measures. Locus of control did not affect expectancy measures.)

[a]LH = Learned helplessness.

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Gatchel, Paulus, & Maples (1975)	30 college students in 2 groups (Inescapable experimental, escapable control). Yoked. Age, IQ, education not reported.	Procedures: (a) Multiple Affect Adjective Check List. (b) 35 trials of escapable or inescapable aversive noise. (c) MAACL. (d) 20 anagram problems. (e) MAACL. (f) Rating of LH.	MAACL depression, anxiety, & hostility mood scale scores. Anagram measures: response latency, no. of failures, trials to criterion. LH ratings.	Partial support for LH/depression. (Inescapable group reported greater feelings of helplessness than escapable group. Anagram measures all indicated helplessness-induced interference. Significant Group by Administration Effects for all MAACL mood scales; groups differed -- inescapable group reported greater depression, anxiety, & hostility immediately after pretreatment, but group difference disappeared after anagram task. Interpreted as increase in emotionality after induced LH, which was alleviated by solvable anagram task.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Miller & Seligman (1975)	48 college students in 6 groups (2 levels of depression by 3 levels of escapability). Yoked. BDI ≥ 9 means depression. Age, IQ, education not reported.	Procedures: (a) Multiple Affect Adjective Check List. (b) 50 trials of unsignalled escapable or inescapable aversive noise; or no noise. (c) MAACL. (d) 20 anagram problems. (e) Manipulation check questionnaire.	MAACL depression, anxiety, & hostility mood scale scores. Anagram measures: response latency, trials to criterion, no. of failures, no. of consecutive, successful solutions prior to reaching criterion.	Partial support for LH/depression. (Compared with nondepressed-escapable-noise & nondepressed-no-noise groups, nondepressed-inescapable-noise group showed poorer anagram performance on 3 of the 4 measures. Compared with nondepressed-no-noise group, depressed-no-noise group showed poorer anagram performance on all 4 measures. However, depressed-inescapable-noise group did not differ from depressed-escapable-noise & depressed-no-noise groups. Inescapable-noise pretreatment increased anxiety, & hostility.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Miller, Seligman, & Kurlander (1975)	48 college students in 3 groups (Depression-anxiety, non-depression-anxiety, non-depression-nonanxiety). BDI ≥ 9 means depression. IPAT ≥ 29 means anxiety. Age & education not reported. WAIS Vocabulary score: non-depressed-anxious higher than non-depressed nonanxious group.	Chance task, & skill task: Line-matching. Learning task: Levine-type discrimination problems. Response initiation task: Shutting off alarm clock.	Skill/chance: Total expectancy change; total increase in expectancy following success; total decrease following failure. Learning: Trials to criterion. Response initiation: Response latency.	No support for LH/depression. (Very marginally and mostly nonsignificant statistical differences. The role of anxiety was not clear because of the absence of the depression-nonanxiety group. Difference in intellectual level between groups.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Klein, Fencil-Morse, & Seligman (1976)	80 college students in 10 groups (2 levels of depression by 5 treatments: Solvable problems; control; unsolvable problems with no attribution instruction, or internal attribution instruction, or external attribution instructions). BDI ≥ 9 means depression. Age, IQ, & education not reported.	Unsolvable problems in 40 trials of Levine-type discrimination task. Test task: 20 trials of anagram problems. Sliding scales of mood.	Test task: Response latency; Trials to criterion; No. of failures; Conditional probability of solving an anagram given that the prior anagram was solved. Ratings: Sadness, nervousness, & anger.	Partial support for LH/depression. (On all 4 anagram measures, depressed controls & nondepressed subjects given unsolvable problems showed poorer anagram performance. But depressed subjects given unsolvable problems did not show performance interference. Mood change data were not clearly reported. Attribution instructions had no effect on nondepressed group, but external attribution instruction improved performance of depressed subjects, i.e., the same as the nondepressed-external-attribution group, but better than the depressed-internal-and-no-instruction groups.) The need to consider the attributional aspects of LH was foreshadowed.

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Klein & Seligman (1976)	(a) 64 college students in 8 groups (Depressed or nondepressed, combined with 3 types of pre-treatments: no, escapable, or inescapable noise, & combined with 3 types of LH reversal treatments: 0, 2, or 4 solvable problems). Yoked. BDI $\geq$ 9 means depression. Age, IQ, education not reported.	Induction: 50 trials of unsignalled aversive inescapable noise. Reversal: Levine-type discrimination task. Test task: Human two-way shuttle box. Sliding scales given 4 times during the experiment.	Test task: Escape latency; trials to criterion for acquisition; no. of failures to escape or avoid; conditional probability of an escape or avoidance given a prior successful trial. Ratings of mood: Sadness, nervousness, & anger.	Partial support for LH/depression. (Both the Depressed-no-noise & the Nondepressed-inescapable-noise groups showed similar deficits in test task measures. Soluble discrimination problems similarly reversed the deficits found in both groups. Poorer performance correlated with higher depression scores. But the similarity of deficits in two groups may not mean similarity of causal underlying processes. No mood change after induction phase; Depressed-reversal-treatment groups became less sad after "therapy" than no-reversal group; no change for nondepressed-inescapable-noise group after reversal treatment.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
	(b) 64 college students in 8 groups as in (a). Yoked. BDI ≥ 9 means depression. Age, IQ, education not reported.	Induction & reversal tasks the same as (a). Test task: Chance (slide-guessing) vs. skill task (raising bearing). Sliding scale rating of mood.	Test task: Expectancy change from Trial 1 to Trial 2; Total expectancy increase after success; Total expectancy decrease after failure; Total expectancy change. Mood ratings: Same as (a).	Support for LH/depression. (Both the Depressed-no-noise & the Nondepressed-inescapable-noise groups showed smaller expectancy change in skill task as compared with control groups; while no differences between groups were found for the chance task. Solvable problems reversed perceptions of response-outcome independence.
Miller & Seligman (1976)	48 college students in 6 groups (2 levels of depression by 3 levels of escapability). Yoked. BDI ≥ 9 means depression. Age, IQ, education not reported.	Inducement: 50 trials of unsignalled inescapable aversive noise. Test tasks: Chance task (slide-guessing) vs. skill task (timed, card-sorting).	Total expectancy change. Expectancy increase following success. Expectancy decrease following failure.	No support for LH/depression. (Only one dependent measure, skill task expectancy decrease following failure, yielded significant difference between the experimental groups (Depressed-no-noise, & Nondepressed-inescapable-noise) and their respective control groups. In particular, the total expectancy change measure did not yield any significance.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
McNitt & Thornton (1978)	40 college students in 4 groups (2 levels of depression by 2 levels of reinforcement). BDI ≥ 9 means depressed, ≤ 5 means nondepressed. Age reported without breakdown. IQ, education not reported.	Chance task: slide-guessing. Skill task: raising bearing on platform. (Each with 10 trials.)	Trial 1 to Trial 2 expectancy change. Expectancy after final trial. Total expectancy change.	No support for LH/depression. (Depressed groups did not differ from the nondepressed on the skill task at 50% reinforcement, and showed larger expectancy changes on the chance task than the nondepressed at 75% reinforcement. Authors suggested that the depressed overgeneralize from any experience of success or failure in forming expectations for future successes.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	[illegible]
Sacco & Hokanson (1978)	48 college students in 6 groups (3 levels of depression: Depressed, non-depressed, non-depressed-inescapable-noise by 2 levels of experimenter conditions: present (public), absent (private)). Criteria for nondepressed: BDI ≤ 5, & MMPI < 55T; for depressed: BDI ≥ 13, or = 10 to 12 with MMPI > 70T. Criteria changed to, for non-depressed: BDI ≤ 8; & for depressed: BDI ≥ 9, about 1 week before experiment. Age, IQ, education not reported.	50 trials of unsignalled aversive inescapable noise. Test tasks: (a) Perceptual task: 15 trials of number-of-lights guessing. (random 50% success). (b) Cognitive task: 20 trials of anagram problems.	Perceptual task: Total expectancy change; Final trial expectancy. Cognitive task: No. of failures; Trials to criterion response latency.	Support for LH/depression. (In private condition, i.e., experimenter absent, depressed subjects showed more expectancy change than nondepressed. In the public condition, i.e., experimenter present, the reverse tendency was suggested. No significant difference for all anagram task measures. Authors suggested that interpersonal factors in the experimental situation might be of importance.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Willis & Blaney (1978)	(a) 45 college students in 2 groups (Depressed, nondepressed) Overlapping BDI criteria: ≥ 9 means depressed; ≤ 9 means non-depressed. Age, IQ, education not reported.	10 trials of skill task (raising bearing on platform).	Trial 1 to Trial 2 change in expectancy. Trial 10 expectancy. Expectancy decrease after failure. Expectancy increase after success. Total expectancy change.	No support for LH/depression. (All nonsignificant difference.)
	(b) 40 college students in 2 groups (Induction, Control) Not yoked. Age, IQ, education not reported.	Induction by noncontingent feedback in 40 trials of a dimension-value finding "skill" task.	Same as (a).	No support for LH/depression. (All nonsignificant difference.)

Table 3a (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
	(c) 47 college students in 2 groups. (Depressed, nondepressed) Age, IQ, education not reported. BDI criteria same as (a).	20 trials of anagram problems.	Response latency. No. of failures. Trials to criterion.	No support for LH/depression. (Only "No. of failures" showed significance, but with no difference in self-reported perceived noncontrol.)
Golib & Asarnow (1979)	58 college students in 4 groups (Depressed vs. Nondepressed by Counselee vs. Noncounselee). BDI ≥ 9 means depressed, ≤ 8 means non-depressed. Age & education not reported; IQ was a dependent measure.	State-Trait Anxiety Inventory (STAI). Mean-Ends Problem-Solving Procedure (MEPS) as interpersonal problem-solving task. (7 trials) 20 trials of anagram problems as impersonal problem-solving task. WAIS-Clark Vocabulary Test as IQ measure.	STAI: State anxiety & trait anxiety scores. MEPS: Means; enumerations; % enumerations; no. of irrelevant-means, no-means, no-response answers; relevance score. Anagram: Response latency; no. of failures; trials to criterion.	No support for LH/depression. (Depressed groups, counselees in particular, showed worse interpersonal problem-solving skills than nondepressed groups, thus providing support for theories emphasizing the importance for interpersonal functioning in depression. Depressed counselees performed no worse than nondepressed noncounselees on impersonal anagram task, thus questioning the application of LH to clinical depression. State anxiety correlated positively with anagram performance. IQ was not related to both tasks.)

Table 3b

Studies on Depression and Learned Helplessness Using Clinically Depressed Subjects

Study	Subject group	Inducement &/or test task	Dependent measure	Result[a]
O'Leary, Donovan, Cysewski, & Chaney (197[illegible])	58 inpatient alcoholics in 4 groups (2 levels of locus of control by 2 levels of experienced control). Groups formed by median splits on Rotter I-E & Tiffany Experienced Control Scales. Age & education reported without breakdown or tests for comparability.	(This is a correlational study to examine the relationship between locus of control, experienced control, & depression. The 2 control measures were assumed to be trait measures analogous to learned helplessness.)	Scores on the MMPI D scale and the Beck Depression Inventory.	Partial support for LH/ depression. (Subjects who reported that they had experienced minimal control over stressful events were significantly more depressed than those who reported relatively high levels of control. No locus of control effect was found. Subjects with an external locus of control and who experienced minimal control were significantly more depressed than the other 3 groups, which did not differ from one another. Experienced rather than expected control appears to be more related to depression.)

[a]LH = Learned helplessness.

Table 3b (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Abramson, Garber, Edwards, & Seligman (1978)	32 patients in 4 groups (24 psychiatric patients in 3 groups: Depressed-schizophrenic, Depressed-non-schizophrenic, Nondepressed-schizophrenic; & 8 nonpsychiatric patients in 1 group: Nondepressed-nonschizophrenic). Age, IQ, education were comparable. Feighner's criteria for diagnosis. BDI ≥ 14 means depressed, ≤ 13 means nondepressed.	Chance task: slide-guessing. Skill task: raising bearing on platform. (Each with 10 trials.)	Total expectancy change. Expectancy increase following success. Expectancy decrease following failure.	Partial support for LH/depression. (Compared with the normal controls and two schizophrenic groups, depressed nonschizophrenic group showed less expectancy changes in skill task on 2 dependent measures, but showed no difference in chance task. Depressed schizophrenics did not show smaller expectancy changes than nondepressed schizophrenics.)

Table 3b (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
O'Leary, Donovan, Krueger, & Cysewski (1978)	62 inpatient alcoholics in 3 groups (3 levels of depression). Age & education reported without breakdown or tests of comparability. BDI ≥ 14 means high depression, 9 to 13 means moderate, and ≤ 8 means low.	Chance task: slide-guessing. Skill task: raising bearing on platform. (Each with 10 trials.)	Trial 1 to Trial 2 expectancy change. Total appropriate shift. Total inappropriate shift. Expectancy after final trial.	No support for LH/depression. (Task effects were found for 3 of the 4 dependent measures. Salience of task characteristics, rather than level of depression, accounted for a larger proportion of behavioral variance with respect to the expectancy statements.)

Table 3b (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Price, Tryon, & Raps (1978)	96 inpatients in 12 groups (70 mixed psychiatric & 26 nonpsychiatric in 3 levels of depression & 4 types of treatment: Active-escape, passive-escape, inescapable noise, no-noise). IQ different for groups; age & education not compared. BDI Short Form, roughly equivalent to Long Form: 0-10 11-22, 23+ groups.	45 trials of inescapable aversive noise. 20 trials of anagram problems.	No. of failures to solve. Response latency. Trials to criterion for solution. No. of consecutive solutions preceding solving of pattern.	Partial support for LH/ depressi[illegible] (Only t[illegible] measu[illegible]es, no. of failur[illegible] response latency, were app[illegible]priate measures. Exposing low-depressed subjects to inescapable [illegible]oise produced as much performance deficits on a subsequent cognitive task as was found in high-depressed subjects not so treated. Within the no-noise group, depth of depression correlated positively with impaired anagram performance. Active-escape & passive-escape groups showed no difference, thus giving no support to Lewinsohn's hypothesis. But subjects were a mixture of vario[illegible] psychiatric and medical pati[illegible]s, [illegible]d it was the sever[illegible] [illegible] depressive symptoms rather th[illegible] [illegible]ychiatric depressive syndrome that was examined.)

Table 3b (Continued)

Study	Subject group	Inducement &/or test task	Dependent measure	Result
Smolen (1978)	64 psychiatric patients in 4 groups (Depressed vs. nondepressed by schizophrenic vs. non-schizophrenic). BDI ≥ 10 means depressed, ≤ 9 means nondepressed. Diagnostic criteria were not specified, & diagnosis was not considered in assigning subjects to groups, thus creating much heterogeneity. Quick Test IQ, age, & education were comparable.	Unspecified no. of trials of a card-sorting (shape, color) & a peg-sorting (shape, color) with skill and then chance instructions.	Expectancy: Total change; Total increase after reinforcement; Total decrease after nonreinforcement. Mood: Total change; Total increase after reinforcement; Total decrease after nonreinforcement. Performance: Total sorting latency; Correct sorting latency.	No support for LH/depression. (Mostly nonsignificant differences in expectancy change, mood change, & performance latency measures.)

subjects. In both cases, the paradigm was similar. In studies using nonclinically depressed subjects, laboratory induced learned helplessness was often compared with natural "learned helplessness" hypothesized to be present in depressed subjects on tests of response-outcome independence. In studies using clinically depressed subjects, the emphasis was on the comparison between the depressed and the nondepressed on tests of response-outcome independence. The assumption was the same in both types of studies: subjects not exposed to induced learned helplessness and nondepressed subjects are considered to have responses dependent on the outcome; whereas subjects exposed to induced learned helplessness and depressed subjects are considered to have responses independent of the outcome.

The 16 studies summarized in Tables 3a and 3b included 19 experiments. College students were included as <u>subject groups</u> in about 70% of these experiments; whereas patients were included in the remaining 30%. Since mildly depressed "normal" university students were the subjects of most experiments, the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was very often the only criterion to determine depression. Following Miller and Seligman's (1973) cut-off criterion, almost all studies using college students adopted a BDI score of 9 or greater as an indication of depression, and a BDI score of 8 or less as nondepression. In those experiments which included patient groups, the BDI criterion varied greatly. Smolen (1978) used a BDI score of 10 or more for depression, and 9 or less for nondepression. Abramson, Garber, Edwards, and Seligman (1978) used a BDI score of 14 or more for depression, and 13 or less for nondepression. O'Leary, Donovan, Krueger, and Cysewski (1978) set up three levels of depression: a BDI score of 14 or more for high depression, 9 to 13 for moderate depression, and 8 or less for low depression. Price, Tryon, and Raps (1978) also established three categories of depression severity, using the BDI Short Form to generate BDI score equivalents: 23 or more for high depression, 11 to 22 for moderate depression, and 0 to 10 for low depression. Beck's original study of the BDI (1967) found a mean score of 10.9 (<u>SD</u> 8.1) for his nondepression group, and a mean of 18.7 (<u>SD</u> 10.2) for his mild depression group. When these figures are compared with the depression criteria used in the learned helplessness patient studies mentioned above, the depression cut-off scores are generally lower than that found in Beck's original study.

As for psychiatric diagnosis, only Abramson et al. (1978) specified their criteria and used psychiatric diagnosis in the classification of patients. O'Leary et al.'s (1978) subjects were all alcoholics. Price et al. (1978) used a group of mixed psychiatric patients as subjects with no consideration for psychiatric diagnosis of depression. Smolen (1978) called his groups depressed, nondepressed, schizophrenic, and nonschizophrenic, but he did not specify his diagnostic criteria, and psychiatric diagnosis was not considered when he assigned his subjects to groups. Thus, except for the Abramson et al. (1978) study, the patient studies examined only the depth of depression in psychiatric patients, but not psychiatric depression as such. Since the Abramson et al. (1978) study was conducted by Seligman and his collaborators, no independent study is available which relates learned helplessness with depression as a psychiatric diagnostic category.

The age, IQ, and education of subjects were generally not reported in the studies reviewed. Comparability on these variables is desirable, because close to one half of the experiments employed problem solving as the test task. Of the few that did report these variables, most of them did not check for comparability between groups. Miller, Seligman, and Kurlander (1975) reported only on IQ: the Wechsler

Adult Intelligence Scale Vocabulary subtest scores of the nondepressed-anxious group was higher than the nondepressed-nonanxious group. O'Leary, Donovan, Cysewski, and Chaney (1977) reported the age and education of their subjects without breakdown by groups or test for comparability. Abramson et al. (1978) reported comparable age, IQ, and education level across groups. McNitt and Thornton (1978) reported on age only, but without breakdown. O'Leary et al. (1978) reported their subjects' age and education without breakdown into groups or test for comparability. Price et al. (1978) did not compare statistically the group age and education level, and found IQ as measured by Jastak Vocabulary Test was not comparable across groups. Smolen (1978) reported that Quick Test IQ, age and education were comparable for his subject groups. In sum, only the Abramson et al. (1978) and the Smolen (1978) studies had adequate reporting on their subjects' age, IQ, and education, and found them to be comparable. In most studies, therefore, a reader is unable to ascertain the effects of these demographic variables on test task performance. For college students, one may assume that there is considerable homogeneity in age and education level, but their variations in intelligence would likely influence their performance on test tasks of a cognitive type. For other subject populations, heterogeneity in age, intelligence, and education are to be expected, and hence must be reported and the degree of comparability between groups specified.

In the experiments reviewed, induced learned helplessness and depression (supposedly natural learned helplessness) were examined. In 53% of the experiments, both induced learned helplessness and depression were included for comparison. In 42%, only depression was included, and in one experiment, only induced learned helplessness was included. Except in one case (Willis & Blaney, Experiment 2), which used noncontingent feedback in a problem solving task to induce learned helplessness, all induction of learned helplessness involved inescapable unsignalled aversive noise.

As for test tasks, 50% followed the paradigm of Miller and Seligman (1973) in the use of skill-versus-chance tasks, and the accompanying expectancy ratings as dependent measures. Thirty-six percent used problem solving tasks, primarily anagram problems; and one experiment used an instrumental task, the two-way human shuttle box. The dependent measures were trials to criterion, number of failures, and response latency. Two other experiments were correlational studies, and did not involve differential performance on a test task.

When the experiments were evaluated for their degree of support for the learned helplessness theory of depression, 53% offered no support, 42% partial support, and one experiment full support. If only the experiments using the skill-versus-chance task paradigm were examined (n = 10), 70% gave no support, 20% partial support, and 10% full support. The factors considered for such an evaluation were similar to those mentioned above for human studies on learned helplessness.

When the present study was first conceived, none of the studies using patients was published. Now, it can be seen that the available patient studies conducted by researchers other than Seligman's collaborators have not investigated depression as a diagnostic category. The patients were mixed psychiatric inpatients or alcoholics with depressive symptoms. Only the Abramson et al. (1978) study considers depression as a psychiatric syndrome, and this study gives only partial support to the learned helplessness hypothesis. The Miller and Seligman (1973) study using nonclinically depressed college students as subjects is still probably the most often cited experiment by Seligman and his collaborators to support the learned helplessness theory of depression. The present study would therefore provide an independent attempt to verify Seligman's learned helplessness model of depression.

Extensions and Modifications in the Present Study

The present study attempted to extend that of Miller and Seligman (1973). While the apparatus, procedure, dependent measures, and methods of data analyses of their study were retained, the following extensions and modifications were added.

Clinically depressed subjects. The subjects of Miller and Seligman's study were college students who scored in the lower, clinically nondepressed range of the Beck Depression Inventory, BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Subjects with a BDI score of 9 or more were assigned to the depressed group; and those with 8 or less to the nondepressed. The present study included psychiatric patients in the depressed group (a BDI score of 18 or more as a measure of depression severity, plus other diagnostic criteria to be detailed later). This would test more directly the applicability of the learned helplessness phenomenon to the clinical population. The nondepressed included both psychiatric patient and normal controls. A more clear-cut separation between the depressed and the nondepressed groups was achieved by assigning subjects with a BDI score of 9 or less (plus other diagnostic criteria) to the nondepressed groups. Subjects with a BDI score from 10 to 17 were excluded.

Reactive versus endogenous depression. Since Miller and Seligman used the depressed in a normal nonclinical population as subjects, the reactive-endogenous dichotomy was not applicable in their study.

The present study compared the reactive depressives with the endogenous depressives, because Seligman (1975) considered the reactive-endogenous dichotomy as the most useful and best-confirmed typology of depression, and suggested that reactive depression is the primary focus of the learned helplessness model of depression. In fact, a considerable number of studies have given some support to such a dichotomy (Carney, Roth, & Garside, 1965; Cropley & Weckowicz, 1966; Hamilton & White, 1959; Horden, 1965; Kiloh & Garside, 1963; Mendels & Cochrane, 1968; Rosenthal & Gudeman, 1967; Rosenthal & Klerman, 1966; Weckowicz, Muir, & Cropley, 1967; Weckowicz, Yonge, Cropley, & Muir, 1971). Further, the reactive-endogenous distinction is based primarily on etiology. The former is hypothesized to be caused predominantly by external experiential factors, while the latter by genetic and/or some internal physiological factors (Mendels, 1970; Mendels & Cochrane, 1968). Thus, from the etiological point of view, if the learned helplessness phenomenon is to be examined among the depressives, the separation of the subjects into the reactive and the endogenous is very important. The present study therefore included the following four groups: (a) reactive depressives, (b) endogenous depressives, (c) nondepressed psychiatric patients, and (d) nondepressed normals.

Passivity and psychomotor retardation. Seligman (1975) sees a parallel between learned helplessness and depression in passivit or what he calls "lowered initiation of voluntary responses". This lowered response initiation is documented by experimental studies of psychomotor retardation in depression (Friedman, 1964; Martin & Rees, 1966; Seligman, Klein, & Miller, 1974; Shapiro & Nelson, 1955; Weckowicz, Nutter, Cruise, & Yonge, 1972; Weckowicz, Tam, Mason & Bay, 1978). The present study, therefore included various psychomotor measures to examine the possible differential performance of the reactive and the endogenous depressives, and their relation to expectancy measures. Psychomotor measures such as digit symbol substitution, tapping speed, reaction time, and figure reversal rate were used.

Lack of aggression. Seligman (1975) sees the lack of aggression in depression as due to learned helplessness. In contrast to psychoanalysts, he does not attribute this lack to the depressed patient's turning aggression against himself/herself. Instead of saying that the depressed subject becomes angry when a love object is lost, and turns this freed anger inward on himself/herself, Seligman considers the absence of overt hostility toward others to be the result of learned helplessness--"it is useless to be hostile and aggressive." The present study included a self-reported measure of hostility, in order to examine whether there is a lack of aggression in learned helplessness as predicted from Seligman's theory.

Internal-external locus of control. Since Miller and Seligman found that externality had no effect on expectancy changes, the present study did not use externality as an independent variable, but included the Rotter I-E score as a measure of externality and saw how it related to expectancy measures and the reactive-endogenous dichotomy in a clinical population.

Mood change. The present study investigated the change of mood during the skill/chance/psychomotor task experimental session. Several forms of a depression adjective checklist were administered at strategic moments to find out if there were differential mood changes across groups and across tasks.

Self-rating of performance. At the end of the experimental session, the subjects were, in the present study, asked to rate themselves on their performance and their aspired-to performance (how they would like to perform). This generated an additional index of the possible group difference in their "helplessness" attitude.

Depression and personality variables. The present study administered to the subjects, outside the experimental session proper, a number of depression and personality inventories to collect data relevant to the reactive-endogenous dimension and learned helplessness. This served as a further check on the validity of diagnosis, and gave additional information about the relationship between learned helplessness and other personality variables. The depression and personality variables included:

1. The severity of depression as measured by self-rating and other-rating scales.

2. The reactive-endogenous distinction.

3. Eysenck's extraversion, neuroticism, and psychoticism.
4. Catell's depression pathological personality factors.

Hypotheses

The following hypotheses were formulated to be verified in the present study:

Expectancy Changes in Skill and Chance Tasks

If the learned helplessness model is applicable to clinical depression, the following three sets of hypotheses confirmed in Miller and Seligman's (1973) study on nonclinical depression should be supported in the present study.

1a. In the skill task, the depressed groups should show smaller expectancy changes than the nondepressed groups.

1b. In the chance task, the depressed groups and the nondepressed groups should not differ in expectancy changes.

2a. Nondepressed groups should show more expectancy changes in the skill task than in the chance task; while depressed groups should show similar expectancy changes in both skill and chance tasks.

2b. The difference in expectancy changes between the skill task and the chance task should be less for the depressed groups than for the nondepressed groups.

3a. In the skill task, the Beck Depression Inventory score should be negatively correlated with the expectancy change scores. (In other words, the more depressed a subject is, the greater should be his/her tendency to perceive reinforcement as responding-independent.)

3b. In the chance task, the Beck Depression Inventory scores and the expectancy change scores should be uncorrelated.

Since Seligman suggested that learned helplessness is most applicable to reactive depression, and since there is no apparent reason to anticipate a differential performance between the non-depressed psychiatric group and the nondepressed normal group, the following hypotheses were tested.

4a. In the skill task, the reactive depression group should show smaller expectancy changes than the endogenous depression group.

4b. In the chance task, the reactive and the endogenous depression groups should not differ in expectancy changes.

4c. In both the skill and chance task, the nondepressed psychiatric and normal groups should not differ in expectancy changes.

Psychomotor and Perceptual Speed Tasks

Since Seligman suggested that "lowered initiation of voluntary responses" is found in both depression and learned helplessness, and since existing literature suggests the presence of psychomotor retardation primarily in endogenous depression (Costello, 1970), the following hypotheses were tested.

5a. In psychomotor and perceptual speed tasks, the depressed groups should show greater retardation than the nondepressed groups.

5b. In psychomotor and perceptual speed tasks, the endogenous depression group should show more retardation than the reactive depression group.

5c. Psychomotor-perceptual retardation should be positively correlated with the intensity of depression. (The more depressed a subject is, the more psychomotorically retarded he/she is.)

Expectancy Changes and Psychomotor Retardation

A discrepancy will occur if one attempts to relate expectancy changes with psychomotor retardation. Seligman associated learned helplessness with reactive depression, but also considered psychomotor retardation as a major symptom of learned helplessness. However, psychomotor retardation has been reported mainly in endogenous depressives. To resolve this discrepancy, the following two alternative hypotheses were put forward:

6a. Reactive depression is etiologically related to learned helplessness, which affects mainly the expectancy change in skill tasks and only to a lesser extent psychomotor retardation measures. Endogenous depression on the other hand is related to a different etiology which gives rise to psychomotor retardation. However, since this condition is not associated with learned helplessness, the expectancy change is not affected.

6b. The measures of expectancy change and psychomotor retardation are correlated and are related to the severity of depression. According to this hypothesis, learned helplessness is associated with general depression and manifests itself by both a lack of expectancy change in skill tasks and psychomotor retardation.

Hostility

Because Seligman suggested a lack of hostility as a result of learned helplessness, the following hypotheses were tested.

7a. The depressed groups should show less hostility than the nondepressed groups.

7b. The reactive depression group (being subject more to helplessness learning) should show less hostility than the endogenous depression group.

Internal and External Locus of Control

Although Miller and Seligman (1973) found that externality had no effect on expectancy changes, the following hypotheses were formulated for the sake of cross-validation.

8a. Depressed groups should show higher externality than nondepressed groups.

8b. The reactive depression group (being subject more to helplessness learning) should show higher externality than the endogenous depression group.

8c. Externality should be negatively correlated with expectancy changes.

Mood Change

If a subject is depressed, his/her mood will also be depressed. Further, since the reactive depressives are more reactive to their environment, they will likely show the greatest amount of mood change or perhaps a progressively more depressed mood as the testing continues. The following hypotheses were tested.

9a. The depressed groups should show more depressed mood than the nondepressed groups.

9b. The reactive depression group should show greater mood change than the endogenous depression group.

Self-Rating of Performance

Because Seligman considered negative cognitive set as a major symptom of depression, a depressed subject will likely have a more self-deprecatory evaluation of his/her abilities. Accordingly, the following hypothesis was tested.

10. The depressed groups should give a lower self-rating of their existing and aspired-to performance than the nondepressed groups.

Depression and Personality Variables

Since the depth of depression is an independent variable in the present study, the following hypotheses were put forward:

11. The scores of the Beck Depression Inventory should correlate with other depression measures, namely, the scores of the Hamilton Depression Rating Scale (Hamilton, 1960), the Zung Self-Rating Depression Scale (Zung, 1965), the Levine-Pilowsky Depression Questionnaire Depression Score (Pilowsky & Boulton, 1970; Pilowsky, Levine, & Boulton, 1969), the Minnesota Multiphasic Personality Inventory D Scale (Hathaway & McKinley, 1967), and the Clinical

Analysis Questionnaire D1, D2, D3, D4, D5, D6, and D7 Scales (Delhees & Cattell, 1975).

Wiener and Harman (Dahlstrom, Welsh, & Dahlstrom, 1972) divided the D Scale of the Minnesota Multiphasic Personality Inventory into two subscales, Depression-Obvious (D-O), and Depression-Subtle (D-S). They found that in general those subjects who showed more severe forms of psychopathology tended to endorse more D-O items than D-S items, while subjects with milder forms of maladjustment endorsed more D-S items than D-O items. Endogenous depression appears to be a more severe form of pathology than reactive depression. The following hypotheses were tested.

12. The reactive depression group should score higher on the MMPI D-S subscale and lower on the D-O subscale than the endogenous depression group.

Another MMPI scale developed by Rosen (1952, 1962) is the Depressive Reaction (Dr) Scale. A high Dr score was claimed to be associated with reactive depression. The following prediction was made:

13. The reactive depression group should score higher on the Minnesota Multiphasic Personality Inventory Dr Scale than the endogenous depression group.

Weckowicz and Tam (Note 3) designed an exploratory instrument called Patient Description Form to differentiate reactive depression from endogenous depression. This questionnaire was based on the consensus across factor-analytic studies by Mendels and Cochrane (1968). A low score is associated with reactive depression. The following hypothesis was therefore tested.

14. The reactive depression group should score lower on the Patient Description Form than the endogenous depression group.

As shown in the Eysenck Personality Questionnaire, Eysenck and Eysenck (1975) claimed that there are three basic personality dimensions: Psychoticism, Extraversion, and Neuroticism. Since endogenous depression appears to be similar to psychotic depression, and reactive depression appears to be similar to neurotic depression, the two groups of depressives may score differently on the Psychoticism Scale and the Neuroticism Scale. No difference in Extraversion is expected. The following hypothesis was tested:

15. The reactive depression group should score on the Eysenck Personality Questionnaire lower on Psychoticism and higher on Neuroticism than the endogenous depression group; and both groups should score similarly on Extraversion.

CHAPTER II

METHOD

Subjects

There were a total of 80 subjects. The 40 depressives (20 reactive, and 20 endogenous) and 20 of the 40 nondepressives were psychiatric patients consecutively admitted to the University of Alberta Hospital during a period of 18 months. The 20 nondepressed normals were paid volunteers who responded to notices of recruitment placed in the University of Alberta Hospital and Campus area. The diagnostic criteria for subject selection are listed in Table 4. A subject had to concurrently fulfill the criteria of all three methods of classification for a particular group before he/she was included in that group. Informed consent to participate in research was an integral part of the subject selection procedure.

The psychiatric diagnosis using the Canadian adaptation of the ICDA-8 and DSM-II (Statistics Canada, 1974) was made by the psychiatrist in charge of the patient. Independently, the patient was diagnosed and administered at a psychiatric interview by Dr. T.E. Weckowicz the two self-report inventories. The Beck Depression Inventory was the same classification instrument used in the study by Miller and Seligman. The Levine-Pilowsky Depression Questionnaire was an instrument developed by numerical taxonomy to maximally discriminate the reactive depressives, the endogenous depressives, and the non-depressed psychiatric patients. Attempts were made to equate the

Table 4

Diagnostic Criteria for Subject Selection

Method of classification	Group[a]	Criterion
Psychiatric diagnosis[b]	RD ED	Unipolar depressive disorder
	NDP	Neurotic or character disorder, with no clinical depression
	NDN	No psychiatric disorder, past or present
Beck Depression Inventory	RD ED	Score ≥ 18
	NDP NDN	Score ≤ 9
Levine-Pilowsky Depression Questionnaire	RD	Reactive (non-endogenous) classification
	ED	Endogenous (non-reactive) classification
	NDP NDN	Nondepression classification

[a]RD = Reactive Depressives; ED = Endogenous Depressives; NDP = Nondepressed Psychiatric Patients; NDN = Nondepressed Normals.

[b]Patients with electroconvulsive therapy in the past 12 months, schizophrenia, or organicity were excluded.

subjects for sex, age, education, and intelligence, as measured by the Clarke-WAIS Vocabulary Test (Paitich & Crawford, Note 1).

The three patient groups were found not to differ in intelligence and education. However, as indicated in Table 5 in which the demographic variables are presented, a comparable group of normal controls was not obtained. The Nondepressed Normal (NDN) group was the most educated and intelligent. Some statistical control would therefore be incorporated into certain data analyses to remedy the situation.

The sex composition of the groups was comparable, $\chi^2(2) = 5$, $p > .05$. In the ED group, there were 5 males and 15 females; in the RD group, 6 males and 14 females; in the NDP group, 10 males and 10 females; and in the NDN group, 7 [illegible] females. Age of the groups was also comparable, $F(3, 76) = 1.89$, $p > .05$; no difference was shown by orthogonal contrasts and multiple range tests. The age range of the four groups was from 18 to 6[illegible] years.

Further, the Beck Depression Inventory scores of the groups were distributed as designed. No difference was found within the two depressed groups and within the two nondepressed groups (see Table 5). Other depression measures also confirmed the depression-versus-nondepression diagnostic classification. (See "Results" section for details.)

It was not possible to control medication: most depressives were receiving tricyclic drugs, and nondepressed patients minor tranquilizers.

Table 5

Statistical Results of the Demographic Variables

Variable	Group[a]	*M*	*SD*	ANOVA *F*[b]	Orthogonal comparison: Contrast[c]	Orthogonal comparison: *t*[d]	Tukey-HSD multiple range test[e]
Age	ED	36.25	11.10	1.89	1	1.33	ED > NDN > RD > NDP
	RD	29.90	9.97		2	1.90	
	NDP	29.05	9.50		3	-.54	
	NDN	30.85	11.50				
Education	ED	11.80	2.71	5.41**	1	-2.25*	NDN > NDP > ED > RD
	RD	11.40	2.70		2	.47	
	NDP	11.80	2.02		3	-2.98**	
	NDN	14.60	3.69				
IQ	ED	101.30	13.21	5.01**	1	-3.37***	NDN > NDP > ED > RD
	RD	97.40	14.31		2	.90	
	NDP	105.50	6.05		3	-1.86	
	NDN	111.95	14.26				
BDI	ED	31.65	5.81	146.56****	1	20.85***	ED > RD > NDP > NDN
	RD	28.00	8.28		2	1.62	
	NDP	5.15	2.98		3	1.38	
	NDN	3.95	2.52				

[a] ED=Endogenous Depressives; RD=Reactive Depressives; NDP=Nondepressed Psychiatric Patients; NDN=Nondepressed Normals.

[b] $df=3, 76$.

[c] 1=(ED & RD) vs. (NDP & NDN); 2=ED vs. RD; 3=NDP vs. NDN.

[d] Two-tailed test with $df = 76$, or less if corrected for lack of homogeneity of variance.

[e] Homogeneous subsets are underlined.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

**** $p < .0001$.

Apparatus and Materials

Questionnaires and forms. Of the following 12 questionnaires, only the Beck, the Levine-Pilowsky, and the Clarke-WAIS were used for subject selection. The others were for checking the validity of diagnosis, and correlational analyses.

1. Beck Depression Inventory, BDI (Beck et al., 1961)
2. Levine-Pilowsky Depression Questionnaire, LPD (Pilowsky, Note 2; Pilowsky et al., 1969) (Appendix A)
3. Clarke-WAIS Vocabulary Test, CWVT (Paitich & Crawford, Note 1) (Appendix B)
4. Hamilton Depression Rating Scale, HDRS (Hamilton, 1960)
5. Zung Self-Rating Depression Scale, ZSDS (Zung, 1965)
6. Patient Description Form, PDF (Weckowicz & Tam, Note 3) (Appendix C)
7. Rotter Internal-External Locus of Control Scale, I-E (Rotter, 1966).
8. Buss-Durkee Hostility Inventory, BDHI (Buss & Durkee, 1957)
9. Depression Adjective Check Lists, DACL (Lubin, 1967)
10. Minnesota Multiphasic Personality Inventory, MMPI (Hathaway & McKinley, 1967)
11. Clinical Analysis Questionnaire, CAQ (Delhees & Cattell, 1975)
12. Eysenck Personality Questionnaire, EPQ (Eysenck & Eysenck, 1975)

There were also three forms for recording demographic data of the subjects, for the patients' consent to participate in research, and for self-rating of performance. A copy of these forms is included in the appendix section (Appendices D, E, and F).

1. Subject Information Form
2. University of Alberta Hospital Consent to Participate in a Study, Form UH-171 (Non-Surgical)
3. Self-Rating of Performance Form

<u>Skill task</u>. The apparatus was a modification of Sky's (1950) apparatus, described by Rotter et al. (1961), and used in Miller and Seligman's (1973) study. The apparatus consisted of a movable platform contained within a vertical plywood frame. A three-metre long nylon string, which the subject pulled in order to raise the platform, was attached to the top of the platform and passed through a pulley. The platform could be moved by pulling on the free end of the string at a distance of about 2 metres from the front of the apparatus. The experimenter could covertly control success and failure by manipulating an electromagnet inserted into a 2 cm hole in the back of the platform. A 1.3 cm steel bearing was held in place on the top of the platform by the electromagnet. When the circuit was broken by the experimenter's depressing the silent switch under the table, the bearing would fall off the platform's slightly slanting surface. Otherwise, the bearing would be held in place when the platform was pulled up. The electrical circuit was connected by attaching small strips of spring brass on both sides of the platform, and keeping them in contact with brass strips lining the interior

track of the frame at the rear of the apparatus. Electrical power was supplied by a hidden six-volt motorcycle battery.

Chance task. The apparatus was a Kodak carousel projector equipped with a slide tray that contained an X slide, an O slide, and a blank slide. The blank slide was positioned between the X and O slides, and was projected onto the screen between trials. The experimenter could covertly control whether an X or an O slide would be presented on each trial by moving the tray either forward or backward.

Psychomotor and perceptual speed tasks.

1. Digit symbol substitution. The Figure Substitution Test, Test No. 7 from the Babcock Test of Mental Efficiency (Babcock, 1965) was used.

2. Tapping speed. A standard two-place tapping speed apparatus (Marietta Apparatus Company, Ohio, U.S.A., Model 24.5, Low Current Impulse Counter), in conjunction with a series of timers (Western Bio-Research, Alberta, Models DT101 and DT203) was used.

3. Reaction time. A reaction time apparatus with three light signals and three press keys at the response panel (Marietta Apparatus Company, Ohio, U.S.A., Model 14.1) was used.

4. Figure reversal. Two figures, the Necker cube and the vase-face, were used. The reversal of the Necker cube was presented first in a viewing box, and then on a card. The box was a 90 x 25 x 25 cm black wooden box with a viewing hole in the front and a Necker cube

drawing on a piece of glass at 70 cm from the viewing hole. The glass drawing was illuminated by a 15-watt b[illegible]rom the rear end of the box. The card form was an 18 x 20 cm black line drawing of the cube on a white 20 x 25 cm card. The vase-face figure was presented in the card form only, a 24.5 x 19.5 cm black and white drawing on a 20 x 25 cm card. Recording was done by connecting a recording key controlled by the subjects to an electric event recorder.

Procedure

Overview. Potential subjects were referred by their psychiatrists-in-charge to Dr. T.E. Weckowicz for a psychiatric interview. When diagnostic consensus was reached, an informed written consent to participate in research was obtained. Dr. Weckowicz then filled in the Subject Information Form, and in a preliminary session, administered the BDI, LPD, and HDRS. Normal potential subjects were seen directly by Dr. Weckowicz and screened for psychiatric involvement, but only the BDI and LPD were given. Subjects fulfilling the selection criteria were seen as soon as possible by an experimenter who did not know the diagnosis of the subjects. In this testing session, the CWVT, ZSDS, I-E, BDHI, CAQ, and EPQ were administered. Meanwhile, the psychiatrist-in-charge filled in the PDF for his patient; and a clinical psychologist independently administered the MMPI. As soon as possible, a subject was further seen by an experimenter who did not know the diagnosis of the subject in a laboratory session. The DACL was administered in this session on four occasions: in the beginning of the session, after the chance task, after the skill task, and after the psychomotor speed tasks. The chance and skill tasks were given in counterbalanced order: half of the subjects had the chance-skill task order, and the other half the skill-chance order. Upon completion of the psychomotor speed tasks, the session was concluded with the subject's self-rating of performance, debriefing, and the payment for research participation.

The administration and scoring of the published questionnaires, inventories, and rating scales were exactly the same as specified by the test constructors. The nonpublished instruments are described in the appendix section. The following sections are a description of the procedures involved in the skill task, chance task, and psychomotor speed tasks.

Skill task. The procedures were the same as those used in Miller and Seligman's (1973) study. The subject was led to a position about 2 metres from the skill task apparatus. A white line was marked on the floor, and the subject was asked to stand behind the line. The instructions were as follows:

> This task is designed to see how well you can succeed in raising the platform (indicate) without letting the ball fall off and also to see how accurate you are in estimating your success. The object of the task is for you to try by pulling this string (indicate) to raise the ball (indicate) on the platform as high as possible before the ball drops off. You will be given 10 trials. The apparatus is built with a slight tilt forward so that the ball is more likely to fall off the platform the higher it is raised. Of course, if you raise the platform very quickly, the ball cannot drop off because of its momentum. Therefore the platform must be raised slowly. Now, in order to be successful, you must raise the platform and the ball to the level marked with the white lines (indicate).

The experimenter then demonstrated the raising of the platform without the steel ball. He then said, "Are there any questions?" If there were, he answered them in the context of the above instructions. If not, he continued to give the instructions for estimating the probability of success and for the payment schedule as follows:

> Before each trial, I would like you to estimate how certain you are that you can raise the platform to the level marked by the white lines without letting the ball fall off. You are to estimate your degree of certainty of success on a scale going from 0 to 10. For example, if you feel fairly certain that you will succeed, you may rate yourself with a high number such as a 9 or 10. If you feel moderately sure that you will succeed, you may rate yourself with a number near the centre of the scale, such as a 4, 5, or 6. If you feel pretty sure that you will not be successful, you may rate yourself with a low number, such as a 0 or 1. You may use any number on the scale from 0 to 10 inclusive. It is important that you select your estimates carefully and that they correspond closely with how certain you really are. They should be an accurate description of the degree to which you really feel that you will or will not succeed.
> In order to make this task and the next task more interesting, I am going to pay you for good performance. You begin the experiment with two dollars to your credit. For each trial in which you are successful, I will add 10 cents to your total. For each trial on which you are unsuccessful, I will subtract 10 cents from your total. Thus, if your performance is good, you may end the experiment with as much as four dollars. If your performance is poor, you may end the experiment with no money at all. The money you have left at the end of both tasks is your earning from these two tasks.
> Are there any questions?
> (If not) Now, before we begin, make an estimate on the 0 to 10 scale as to what you think your likelihood is of succeeding on the first trial.
> (Before the second trial) How would you rate yourself for the next trial? (And so forth.)

Before each trial, the experimenter recorded the subject's verbalized expectancy in the scoring sheet shown in the appendix section. The subject held the free end of the nylon string, and the experimenter put the steel bearing on the platform. For reinforced trials, the bearing was released by pressing the silent switch with the thigh after the platform reached the maximum, i.e., higher than the white lines and as close to the top as possible. For nonreinforced trials, the silent switch was pressed immediately after the subject began to raise the platform, i.e., lower than the white lines and as close to the bottom as possible. Attempt was made to avoid pressing the switch always near the same position; some minor variations were created so that the subject would feel that things were happening naturally.

Chance task. The procedures were the same as those used by Miller and Seligman (1973). When the subject was comfortably seated before the slide screen, the instructions were given as follows:

> This task is designed to see how well you can do at telling me beforehand which of two kinds of slides will appear next on the screen and also to see how accurate you are in estimating your success. In this projector we have a number of slides marked with either an X or an O. These slides are divided into groups of five. Each set of five slides was shuffled before being placed in the projector. There are not necessarily the same number of X's and O's in each set. Before we begin, I will select at random one of these sets of five slides and position it for projection. You are to tell me whether the first slide in the group will be an X or an O. After you have told me, I will project the slide onto the screen, and you will then know whether you were right or wrong. Then, the next slide in the group will be in position and again you will tell me whether it will be an X or an O. In this way, we will go through all five slides of the group. Each set of five slides will constitute one trial. We will continue until we have gone through 10 trials. I will also be keeping score and will let you know how well you did at the end of each trial. Now, in order to be successful on a trial, you must get at least 4 slides right. In other words, 4 or 5 slides right, out of the 5 slides in a set will mean that you have succeeded. Any number of slides below 4 will mean that you have not succeeded. Are there any questions?

If not, the experimenter gave the instructions for estimating the probability of success and for the payment schedule as mentioned above for the skill task. In this context, one of the sentences was changed to:

> Before each trial, I would like you to estimate how certain you are that you can correctly predict 4 or 5 slides out of 5.

Of course, when the chance task was presented after the skill task, the instructions for estimated expectancy and payment was shortened. When the subject understood the nature of the task, the experimenter manipulated the slides by a remote control switch. On reinforced trials, the slide similar to the subject's prediction was shown. On nonreinforced trials, the slide opposite to the subject's prediction was projected.

For both tasks, a 50% reinforcement schedule was used. Trials 1 and 10 were always reinforced so that the same dependent measures used by Rotter et al. (1961) and Miller and Seligman (1973) could be used. The sequence of reinforcement and nonreinforcement on Trials 2 to 9, and the within-trial number and order of slides to be reinforced were randomized and predetermined before the laboratory session.

Psychomotor and perceptual speed tasks. After the subject was paid the money he had earned in the skill and the chance tasks, he was given a five-minute rest period. Then the psychomotor speed tasks were given. The procedures were with some small changes, similar to those employed in Weckowicz, Nutter, Cruise, & Yonge

(1972) and in Weckowicz, Tam, Mason, & Bay (1978).

<u>For digit symbol substitution</u>, the instructions were:

> Look at these figures and the numbers in each of them: (Point to the top line of figures with numbers in them.) You are to put in each of these (point to first line) the number in the figure like it up here (point to key again). (Illustrate further by showing which numbers go in the first two figures of line one. Point to each figure in turn.) See, in this one goes a "two," and in this one goes a "one." (Point to the third figure in line one) What goes in here? (Show right number if subject is unable to make correct response or does not make a response. (Follow the same procedure for the fourth figure, and starting from the fifth figure) Now fill all these the same way; take them in order like this (indicate each of five lines in order from subject's left to right). You may look up here all you need to (point to key). Don't skip any. (If subject makes an error in first line, tell him/her to look at top and be sure to get them right.)

Timing with a stopwatch went continuously, and time was recorded at the end of each line completed. The score was the number of seconds required to complete each of the five lines. For left-handed subjects who wrote in a manner that would cover the key up, a second worksheet was provided with only the key exposing.

For <u>tapping speed</u>, the instructions were:

> (After the timers were turned on) This is a simple device which is intended to find out how quickly you can tap back and forth with this pen on these two plates (demonstrate). Let your forearm rest on the table in a comfortable position, hold the plates with the other hand, hold the tapper in an upright position, and lean slightly forward (demonstrate). Make the tapping movement mostly from the wrist, rather than from the elbow (demonstrate). Remember to tap as rapidly as possible. You'll have three trials with rest between trials. At the signal "Ready," place your arm in a position to tap, and at the signal "Go," start tapping and continue until the signal "Stop."

> The more completely you relax between trials, the faster you can tap. Ready--Go!

There were three trials each of 30 seconds, with 30-second rests between trials. The subject was warned to get ready toward the end of each rest. The number of taps was recorded by an automatic counter, and the timers automatically timed both the trials and the rests. The score was the number of taps for each of the three trials.

For reaction time, there were three levels differing in the amount of information to be processed by the subject. For Level One, the instructions were:

> (After the subject understood that he/she was to use his/her dominant and preferred hand for pressing keys.) This is a test to see how fast you can react. Put your finger or fingers on the left key, but do not press it. The light above the key will be on, and as soon as it is on, press the key. Do it as fast as possible. You will hear a click just before the light comes on and that will warn you to get ready. Do you understand the instructions? (A practice trial was given, and if the subject reacted to the click instead of the light) Just relax until you hear the click. Wait for the click, and then start getting ready.

The reset switch click was used as the warning signal which preceded the flashing of the light by two seconds. There were six trials after the practice trial. The reaction times were recorded to the nearest .01 second. For Level Two, the instructions were:

> From now on, one of these three lights may come on, and I want you to press the key under the light that comes on. Do it as quickly as possible. Again you will hear a click just before the light comes on, and that will warn you to get ready. Start with one hand above but clear of all the keys. It is not necessary to guess which light is coming on. Ready?

The stimulus and response dials, which determined which light flashed and which lever key was effective, were reset before each trial in a predetermined order. There were six trials, with time recorded to the nearest .01 second. For Level Three, the instructions were:

> Now we will do another reaction time task. As you see, there are three lights that flash, one at a time -- left, middle, and right. Before, I asked you to press the key directly below the light that flashed. This time, when the left light is on, you will have to press the key at the extreme right (show the light-lever code card and put it in front of the subject; and demonstrate). When the right light flashes, press the key in the middle (demonstrate). When the middle light is on, press the key on the extreme left (demonstrate). Remember: Left light--right key, right light--left key, and middle light--left key. Again, you will hear a click just before the light comes on, and that will warn you to get ready. Start with one hand above but clear of all the keys. When the light is on, press the correct key as quickly as possible. Do you understand? (If the subject did not understand, repeat the instructions.) If you make a mistake, just correct yourself as quickly as you can. You may have a few seconds to look over the diagram. (Wait a while) Okay, now we'll try it.

The stimulus and response dials were set in a predetermined order before each trial. Again, there were six trials, recorded to the nearest .01 second.

Figure reversals consisted of two forms, the viewing box and the card. For the Necker cube reversal (viewing box), the instructions were as follows:

> (When the subject was comfortably seated, he/she was shown an 18 x 20 cm black line drawing of the Necker cube on a white 20 x 25 cm card. The subject was given some pre-stimulation about the nature of the reversal--as minimal and standardized as possible, but the

experimenter had to be sure that the subject knew what the reversal was.) What do you see in this picture? (Hold card vertically) (Regardless of the subject's reply) This is a cube or a box. It has three dimensions: length, width, and height. (Indicate the dimensions by moving a finger along the length, width, and height of the cube in its "normal" position.) Like a transparent glass cube or a hollow box-like frame, you can see both the front (indicate) and the back (indicate), the top (indicate) and the bottom (indicate), and the sides (indicate) all at the same time.
Look at the cube for a while. (Pause) Do you see the cube appear to you in two different ways? (Regardless of the subject's response) The cube at one moment has the black dot closest to you, like a cargo box being placed on the ground, and you are looking at it from above and can see its top surface. (Show the subject a transparency of this "normal" perspective and place it on the card to consolidate the subject's understanding.) At another moment, the black dot is farthest from you; the cube is like a cargo box being lifted up to the air, and you are looking at it from below, and can see its bottom surface. (Show the subject a transparency of this "reversed" perspective and place it on the card to consolidate his understanding.) This fluctuation of perspective is called "reversal". It is called "normal" when the dot is closest to you and the cube is like resting on the ground; and it is called "reversed" when the dot is farthest from you and the cube is like up in the air. Now, I would like you to practise using this recording key. Look at this picture. When the cube is "normal", do not press the key; but as soon as it appears to you in the "reversed" position, press the key and hold it until it shifts back to the "normal" position. (Practise for two fluctuations.) Now, let's adjust the height of the chair so that your eyes are on the same level as the hole of the viewing box. (Adjust chair height, and place the recording key close to the subject's dominant hand.) When I turn on the light in the viewing box, you'll see a similar cube. Start looking at the cube in its "normal" position. When it shifts to the "reversed" position, press the key and hold it. When the cube comes back to its "normal" position, release the key. Relax yourself and let any changes come naturally. Keep on pressing or releasing

the key with the changes of the cube until I say, "Stop". Are there any questions?
(If not, cover the subject's head with the opaque cloth of the viewing box.) Ready--go! (Turn on the box light and the event recorder simultaneously. After three minutes, say, "Stop," and turn off the light and the recorder simultaneously.)

The event recorder record was analysed later on. The scores in the forms of frequency and duration of reversals per ten-second interval were entered in a form shown in the appendix section. These are the same for all figure reversal tasks. For the vase-face reversal (card) task, the instructions were as follows:

(In a well-lit room, the subject stood against a wall 150 cm away from a white 20 x 25 cm card with a vase-face figure measuring 24.5 x 19.5 cm. The card was placed against a black background on the subject's eye level; and the recording kay was by the side of the subject's dominant hand.)
What do you see in this picture?
(If the subject mentioned only the vase or the faces)
What else do you see in this picture?
(Regardless of the subject's answer) At one moment, you see the white vase, or the bottle in the middle of the picture (indicate). At another moment, you see two black faces looking at each other (indicate). This is also called a fluctuation or a reversal.
Are there any questions?
(If not) I want you to close your eyes for a while. When I say, "Ready--Open," open your eyes and look at the vase first. As soon as you see the picture changes to the faces, press the key and hold it. Release the key when the picture changes back to the vase. Keep yourself relaxed and let the changes come naturally.
Remember: Start with the vase; press the key when the picture becomes the faces, and release the key when the picture becomes the vase again. Keep on pressing or releasing the key with the picture changes until I say, "Stop." Are there any questions?
(If not) Close your eyes. Ready. Open!

For the Necker cube reversal (card) task, the instructions were as follows:

> (Standing in the same place as in the vase-face task)
> This is the cube you saw a while ago. It is the cube that fluctuates: at one moment, it is in the "normal" position, and at another moment, it is in the "reversed" position.
> I want you to close your eyes for a while. When I say, "Ready--Open!" open your eyes and look at the cube in its "normal" position first. As soon as you see the cube change to its "reversed" position, press the key and hold it. Release the key when the cube returns to its "normal" position. Keep relaxed, look at the cube passively and let any changes come naturally. Remember: Start with the "normal" position. Are there any questions? (If not) Close your eyes. Ready. Open!

Self-rating of performance. The subject was asked to mark on a form (shown in the appendix section) along a seven-point scale, from very poor to very good, to show how well he/she performed on the tasks of the session, and how he/she would like to perform on such tasks compared to other people of his/her age and background.

Finally, the patient subject was paid $2, and the normal volunteer $12 for his/her participation in the study.

Dependent Measures

Questionnaires and forms. The following measures were obtained.

1. Clarke-WAIS Vocabulary Test: Estimated Wechsler Adult Intelligence Scale full scale IQ equivalent, generated from 40 vocabulary item scores.
2. Hamilton Depression Rating Scale: Sum of 21 item ratings to yield a Total Score, which ranges from 0 to 60.
3. Zung Self-Rating Depression Scale: Sum of 20 item ratings to yield a Total Score, which ranges from 0 to 80.
4. Patient Description Form: Sum of 16 item ratings to yield a Total Score, which ranges from 0 to 29.
5. Rotter Internal-External Locus of Control Scale: Sum of 29 item ratings to yield an Externality Score, which ranges from 0 to 23.
6. Buss-Durkee Hostility Inventory: Ratings of 75 items to yield a Total Hostility Score (range 0 to 66) and a Guilt Score (range 0 to 9).
7. Depression Adjective Check Lists: Each of Forms A, B, C, and D gives ratings of 32 adjectives, yielding a Total Score which ranges from 0 to 32.
8. Minnesota Multiphasic Personality Inventory: T-Scores of *D*, *D-O*, *D-S*, and *Dr* scales.

9. Clinical Analysis Questionnaire: Scores on the scales of D1, D2, D3, D4, D5, D6, and D7.

10. Eysenck Personality Questionnaire: Ratings on 90 items to yield the four scores of Psychoticism (P), Extraversion (E), Neuroticism (N), and Lie (L).

11. Self-Rating of Performance Form: (a) Present Performance Ratings (range from 0 to 7); and (b) Aspired-to Performance Rating (range from 0 to 7).

Skill and chance tasks. The three basic expectancy change dependent measures were the same as those in Miller and Seligman's (1973) study. They were: (a) Change from Trial 1 to Trial 2 (T1T2), (b) After Task Expectancy (ATE), and (c) Total Expectancy Change in Expected Direction (TCE). Measure a was a measure of the expectancy change following reinforcement on Trial 1, which was always reinforced. Measure b was the expectancy after Trial 10; it was a measure of the cumulative effects of previous reinforcements and nonreinforcements over all trials on the subject's expectancy. Measure c was obtained by summing the absolute value of the difference in expectancies between one trial and the next for all trials in which the subject increased his/her expectancy following reinforcement or decreased his/her expectancy following nonreinforcement. It was a measure of the appropriate shifts in expectancy. The fourth measure, Total Expectancy Change in Opposite Direction (TCO), was not used by Miller and Seligman (1973), but used by Rotter, Liverant, and Crowne (1961), and recommended by Costello (1978). It was obtained by summing the absolute values of the difference in expectancies between one trial and the next for all trials in which the subject decreased his/her expectancy following reinforcement or increased his/her expectancy following nonreinforcement. It was a measure of inappropriate shifts in expectancy, and should be of greater interest than TCE if depressed subjects were indeed learned-helpless.

Owing to the unequal initial expectancies found between groups (see "Results" section for details), the expectancy ratings of all trials in both tasks had to be adjusted or corrected for this inequality. A multiple regression was carried out (see "Results" section for details). The adjusted expectancy rating on Trial 2 was actually a difference score between Trial 1 and Trial 2. Consequently, the dependent measure T1T2 became simply the adjusted rating on Trial 2.

Psychomotor and perceptual speed tasks. The dependent measures of the various tasks were as follows:

1. Digit Symbol Substitution: Time spent in seconds, to complete each of the five lines, and the mean time spent.
2. Tapping Speed: Number of tappings per trial, and the mean number of tappings.
3. Reaction Time: Time in seconds for each trial, and the mean time.

1. Figure Reversal (Necker Cube, Vase-Face): Number of reversals, duration of the normal phase, and duration of the reversed phase per 10-second interval and per minute; and the mean for three minutes.

CHAPTER III

RESULTS

Overview of Data Analyses

Validity of Diagnostic Procedure

One-way analyses of variance, orthogonal comparisons, and multiple range tests were applied to the BDI, HDRS, LPD, ZSDS, and DACL to see if the depressives and nondepressives were correctly classified. In particular, the PDF was examined to see if the endogenous depressives and reactive depressives scored differently.

Expectancy Changes in Skill and Chance Tasks

First of all, in order to determine if there were differences between groups on initial expectancy, a Group X Order X Task analysis of variance was conducted. Second, since there were a Group effect and a Group X Task interaction in the above ANOVA, a multiple regression was performed to adjust all expectancy ratings for unequal initial expectancies. Third, for the four dependent measures, a series of analyses for variance (4 Groups X 2 tasks), one-way analyses of variance using skill task scores, chance task scores, and skill-minus-chance difference scores, and analyses of covariance using age and/or intelligence as covariates was carried out. Fourth, orthogonal comparisons were done: Depressed versus Nondepressed, Endogenous Depression versus Reactive Depression, and Nondepressed Psychiatric Patients versus Nondepressed Normals. This gave more refined information about the relationships between groups not provided by the analyses of variance. Fifth, the Tukey-HSD multiple range test was applied to find out more specific relationships between the group means. Finally, the Pearson product-moment correlation coefficients between the Beck Depression Inventory and the expectancy measures were calculated.

Psychomotor and Perceptual Speed Tasks

One-way multivariate analyses of variance on five psychomotor and six perceptual speed test variables were carried out to examine the overall performance of the four groups on these speed tasks. Then a series of analyses of variance, orthogonal comparisons, and multiple range tests were carried out to test Hypotheses 5a, 5b, and 5c. The design for the Digit Symbol Substitution scores was a 4 x 5 mixed factorial with the 4 groups as the between-subject factor and the 5 lines as the repeated-measure factor. The design for the Tapping Speed task was a 4 x 3 mixed factorial with the 4 groups as the between-subject and the 3 trials as the repeated-measure factor. The design for the Reaction Time task was a 4 x 3 x 6 mixed factorial with the 4 groups as the between-group factor and the 3 levels of complexity and the 6 trials as the repeated-measure factors. Figure reversal variables were analysed by one-way analyses of variance only because the initial MANOVA results were nonsignificant.

Hostility, Locus of Control, Mood Change, Self-Rating of Performance, and Other Personality Variables

For most of the variables, one-way analyses of variance, together with orthogonal comparisons, and multiple range tests, served to test the hypotheses. Some two-way analyses of variance were also employed, e.g., the DACL mood change measures were analysed with a 4 Groups X 4 DACL Measures analysis of variance.

Pearson product-moment correlation coefficients were calculated for selected variables relevant to Hypotheses 7 to 15. For instance, the BDI scores were correlated with the demographic variables, other depression and personality measures, self-rated performance, and psychomotor speed measures. The demographic variables, such as age and intelligence, were also correlated with various dependent measures.

Discriminant analyses were carried out on selected variables to obtain the maximum discrimination among all four groups and among the two depression groups.

Factor analyses (principal factoring with iterations) with orthogonal and/or oblique rotated factors were performed on selected variables. The normal control group was included or excluded from some analyses to see if there was major difference between the two procedures. Confirmatory factor analyses using a target matrix based on Eysenck's three dimensions of personality were also carried out. Factor transformations were done by orthogonal procrutes rotation.

Results of Data Analysis

The alpha error level of .05 was adopted.

Validity of Diagnostic Procedure

The validity of the diagnostic procedure was supported by the scores on ancillary depression measures not used for subject assignment. The means, standard deviations, and the results of analyses of variance, orthogonal comparisons, and Tukey multiple range tests are presented in Table 6. The HDRS was given only to the three patient groups, which were significantly different from one another, $F(2, 57) = 95.23$, $p < .0001$. The LPD total depression score, which was not used for subject classification, showed significant group differences, $F(3, 75) = 96.23$, $p < .0001$. The ZSDS yielded significant differences between the depressed and the nondepressed groups, $F(3, 76) = 70.63$, $p < .0001$. When the four forms of the DACL were combined, the total depressive mood score also gave significant difference between the depressed and the nondepressed, $F(3, 76) = 21.19$, $p < .0001$. In all measures, the Endogenous Depressive group was more depressed than the Reactive Depressive group; and in two measures, HDRS and LPD, the two groups means were found to be significantly different by orthogonal comparisons and the Tukey multiple range test. However, such a difference between the ED and the RD groups was not present in the BDI, the instrument used for subject selection and assignment. The PDF, which was given only to the patient groups, yielded a significant between-group difference, $F(2, 57) = 7.61$, $p < .01$, and a significant reactive-versus-

Table 6

Statistical Results of the Ancillary Depression Measures

Measure	Group	M	SD	ANOVA F[a]	Orthogonal comparison Contrast[b]	t[c]	Tukey-HSD multiple range test[d]
HDRS	ED	23.60	5.21	95.04***	1	NA	ED > RD > NDP
	RD	16.55	2.95	(df=2,57)	2	5.27**	
	NDP	6.15	3.59		3	NA	
LPD	ED	13.25	2.15	96.23***	1	16.59**	ED > RD > NDP > NDN
	RD	10.45	3.02		2	3.60**	
	NDP	3.25	2.40		3	1.76	
	NDN	1.82	2.10				
ZSDS	ED	56.30	10.19	70.63***	1	14.35**	ED > RD > NDP > NDN
	RD	51.10	8.19		2	1.78	
	NDP	30.45	6.57		3	1.60	
	NDN	27.55	4.80				
DACL-1	ED	15.30	6.41	17.91***	1	7.19**	ED > RD > NDN > NDP
	RD	12.90	7.11		2	1.12	
	NDP	5.15	4.03		3	-.30	
	NDN	5.50	3.33				
DACL-2	ED	15.15	7.94	19.09***	1	7.20**	ED > RD > NDP > NDN
	RD	11.60	5.57		2	1.64	
	NDP	3.70	2.68		3	-1.69	
	NDN	5.55	4.11				

Table 6 (Continued)

Measure	Group	M	SD	ANOVA F[a]	Orthogonal comparison Contrast[b]	Orthogonal comparison t[c]	Tukey-HSD multiple range test[d]
DACL-3	ED	15.25	7.97	15.49***	1	6.47**	ED > RD > NDP > NDN
	RD	11.40	6.21		2	1.70	
	NDP	4.85	4.37		3	-.29	
	NDN	5.20	3.21				
DACL-4	ED	15.50	6.86	9.15***	1	5.02**	ED > RD > NDN > NDP
	RD	12.95	6.18		2	1.38	
	NDP	7.15	5.72		3	-.54	
	NDN	8.15	4.36				
PDF	ED	15.10	7.35	7.61*	1	NA	ED > RD > NDP
	RD	9.40	4.56	(df=2, 57)	2	2.95*	
	NDP	8.80	4.53		3	NA	

[a] df = 3, 76, except specified otherwise.
[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN
[c] Two-tailed test with df = 76, or less if corrected for lack of homogeneity of variance.
[d] Homogeneous subsets are underlined.
* $p < .01$.
** $p < .001$.
*** $p < .0001$.

endogenous contrast, $t(32) = 2.95$, $p < .01$. The ED group had a significantly higher endogenicity score than the RD group, but according to Tukey multiple range test, the RD group did not differ from the NDP group. The PDF results seemed to support the validity of the endogenous-reactive diagnostic dichotomy.

Expectancy Changes in Skill and Chance Tasks (Hypotheses 1 to 4)

Initial expectancy in skill and chance tasks. The means and standard deviations of the skill and chance tasks initial expectancy ratings are presented in Table 7.

In order to assess whether the four groups were similar in their initial expectancy ratings, a three-way Group X Order X Task repeated-measure analysis of variance was carried out. As shown in Table 8, the Group effect, $F(3, 72) = 3.43$, $p < .05$, and the Group X Task interaction, $F(3, 72) = 3.11$, $p < .05$, were significant. The Group effect was due primarily to the higher expectancy ratings of the Nondepressed Psychiatric group than those of the other groups. The interaction was due largely to higher ratings of the Endogenous Depression and Nondepressed Normal groups on the chance task than the skill task, and the reverse in the Reactive Depression and Nondepressed Psychiatric group. Since the groups were not comparable on their initial expectancy ratings, it was necessary to correct the raw scores for the initial rating differences before the dependent measures were examined. The corrected (adjusted) scores were obtained by regressing each post-trial expectancy of the skill and

Table 7

Means and Standard Deviations of
the Skill and Chance Tasks Initial Expectancies

Group	Skill task		Chance task	
	M	SD	M	SD
ED	3.90	2.22	4.70	2.11
RD	4.35	1.98	3.70	2.15
NDP	5.89	2.39	5.15	2.50
NDN	3.50	1.91	4.10	1.74

Table 8

4 Groups X 2 Orders X 2 Tasks Analysis of Variance of the Initial Expectancy Ratings

Source	SS	df	MS	F
Groups	68.82	3	22.94	3.43*
Orders	3.91	1	3.91	.58
Groups X Orders	59.92	3	19.97	2.99*
Subjects within groups	481.45	72	6.69	
Between subjects	614.09	79		
Tasks	.01	1	.01	.00
Groups X Tasks	16.11	3	5.37	2.62
Orders X Tasks	.51	1	.51	.25
Groups X Orders X Tasks	1.22	3	.41	.20
Tasks X Subjects within groups	147.65	72	2.05	
Within subjects	168.50	80		

* $p < .05$.

chance tasks on the initial expectancies of both tasks. It was a multiple regression with the initial skill and chance expectancies as two independent variables (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). The constants and coefficients for each post-trial expectancy score used in this regression procedure are presented in Table 9.

Table 9

Constants and Coefficients for Corrected After-Trial Expectancies in Skill and Chance Tasks

Task	Trial	Constant	Coefficient for skill task initial expectancy	Coefficient for chance task initial expectancy
Skill	1	4.41	.64	-.12
	2	4.59	.68	-.23
	3	4.80	.40	.04
	4	4.69	.38	.03
	5	4.31	.37	.06
	6	3.99	.36	.15
	7	3.91	.38	.18
	8	3.03	.46	.29
	9	3.85	.29	.31
	10	5.34	.14	.23
Chance	1	1.86	.03	.74
	2	1.56	.10	.66
	3	1.30	-.03	.83
	4	1.29	.07	.70
	5	1.12	.11	.70
	6	.58	.06	.86
	7	1.16	.03	.76
	8	.68	.01	.81
	9	.47	-.12	.96
	10	1.68	-.15	.86

Note. Regression equations are in the following forms:

$$\hat{X}_2 = 4.41 + .64X_1 + (-.12Y_1)$$

$$X_2' = X_2 - .64X_1 - (-.12Y_1)$$

where X_1 is the initial expectancy for skill task;

Y_1 is the initial expectancy for chance task;

$\hat{X}_2$ is the regression score for "Expectancy after Trial 1";

X_2' is the corrected score for "Expectancy after Trial 1".

Expectancy dependent measures. The adjusted scores of the four expectancy dependent measures were analysed by 4 Groups X 2 Tasks (randomized block design, repeated measures, fixed-effect model) analyses of variances, as summarized in Table 10.

For Expectancy Change from Trial 1 to Trial 2 (T1T2), the scores used for analysis were not the difference scores obtained by subtracting Trial 1 expectancies from Trial 2 expectancies. Instead, the corrected expectancy scores after Trial 1 were used, because regression procedures had made them, in fact, difference scores. ANOVA indicated that the Group effect, $F(3, 74) = .79$, $p > .05$, and the Group X Task interaction, $F(3, 74) = .65$, $p > .05$, were not significant. Only the Task effect, $F(1, 74) = 163.35$, $p < .01$, was significant.

For the measure After Task Expectancy (ATE), ANOVA showed that both the Group effect, $F(3, 74) = 2.35$, and the Group X Task interaction, $F(3, 74) = 2.54$, were marginally significant ($p < .10$); and that the Task effect was highly significant, $F(1, 74) = 252.14$, $p < .01$.

For Total Expectancy Change in Expected Direction (TCE), ANOVA indicated that the Group effect, $F(3, 74) = 2.56$, $p < .10$, was marginally significant; that the Group X Task interaction, $F(3, 74) = .53$, $p > .05$, was nonsignificant; and that the Task effect, $F(1, 74) = 16.87$, $p < .01$, was significant.

For the measure Total Expectancy Change in Opposite Direction

Table 10

4 Groups X 2 Tasks Analyses of Variance of Expectancy Measures Using Corrected Ratings

Source	SS	df	MS	F
Expectancy change from Trial 1 to Trial 2 (T1T2)				
Groups	5.37	3	1.79	.79
Subjects within groups	172.12	76	2.27	
Between subjects	177.49	79		
Tasks	258.70	1	258.70	163.35**
Groups X Tasks	3.06	3	1.02	.65
Tasks X Subjects within groups	120.36	76	1.58	
Within subjects	382.12	80		
After task expectancy (ATE)				
Groups	40.99	3	13.66	2.35^{t}
Subjects within groups	441.68	76	5.81	
Between subjects	482.68	79		
Tasks	536.22	1	536.22	252.14**
Groups X Tasks	16.22	3	5.41	2.54^{t}
Tasks X Subjects within groups	161.63	76	2.13	
Within subjects	714.07	80		
Total expectancy change in expected direction (TCE)				
Groups	275.10	3	91.70	2.56^{t}
Subjects within groups	2,719.59	76	35.78	
Between subjects	2,994.69	79		
Tasks	255.56	1	255.56	16.87**
Groups X Tasks	24.14	3	8.05	.53
Tasks X Subjects within groups	1,151.14	76	15.15	
Within subjects	1,430.84	80		

Table 10 (Continued)

Source	SS	df	MS	F
Total expectancy change in opposite direction (TCO)				
Groups	109.88	3	36.64	1.97
Subjects within groups	1,416.87	76	18.64	
Between subjects	1,526.75	79		
Tasks	32.16	1	32.16	5.33*
Groups X Tasks	5.14	3	1.71	.28
Tasks X Subjects within groups	458.81	76	6.04	
Within subjects	496.10	80		

^{t}Trend ($p < .10$).
*$p < .05$.
**$p < .01$.

(TCO), ANOVA showed that both the Group effect, $F(3, 74) = 1.97$ and the Group X Task interaction, $F(3, 74) = .28$, were nonsignificant, ($p > .05$); and that the Task effect, $F(1, 74) = 5.33$, $p < .05$, was significant.

The overall findings of this part of the experiment may be summarized as follows:

1. Only the Task effect was consistently highly significant, indicating success in presenting the tasks as skill and chance tasks.

2. The Group effect and the Group X Task interaction were either nonsignificant or showed only a trend. This interaction, which was of special interest to determine the hypothesized differential expectancy of depressed and nondepressed subjects, was not supportive of the hypotheses.

In addition, the same type of ANOVA was applied to the noncorrected expectancy scores and yielded very similar results (See Table 11). One-way ANOVA for each skill and chance expectancy variable using corrected or noncorrected ratings confirmed the general absence of group differences except for the chance task ATE measure. (See Table 12 for group means, standard deviations, and ANOVA F values.)

To further assess the hypothesized between-task differential expectancy ratings between the depressed and the nondepressed groups, one-way analyses of variance were carried out using "skill task minus chance task" difference corrected scores. Table 13

Table 11

4 Groups X 2 Tasks Analyses of Variance of Expectancy Measures

Using Noncorrected Expectancy Ratings

Measure	Source	SS	df	MS	F
T1T2	Groups	11.33	3	3.78	1.28
	Subjects within groups	223.65	76	2.94	
	Between subjects	234.98	79		
	Tasks	84.10	1	84.10	45.31**
	Groups X Tasks	7.85	3	2.62	1.41
	Tasks X Subjects within groups	141.05	76	1.86	
	Within subjects	233.00	80		
ATE	Groups	75.67	3	25.23	3.08*
	Subjects within groups	623.08	76	8.20	
	Between subjects	698.75	79		
	Tasks	187.06	1	187.06	67.19**
	Groups X Tasks	16.87	3	5.62	2.02
	Tasks X Subjects within groups	211.58	76	2.78	
	Within subjects	415.50	80		

Table 11 (Continued)

Measure	Source	SS	df	MS	F
TCE	Groups	331.87	3	110.62	1.95
	Subjects within groups	4,309.08	76	56.70	
	Between subjects	4,640.95	79		
	Tasks	558.75	1	558.75	25.54**
	Groups X Tasks	102.28	3	34.09	1.56
	Tasks X Subjects within groups	1,662.48	76	21.88	
	Within subjects	2,323.50	80		

* $p < .05$.
** $p < .00001$.

Table 12

Means, Standard Deviations, and Results of Analyses of Variance of the Skill and Chance Task Expectancy Measures Using Noncorrected and Corrected Ratings

Measure	Group	*M*	*SD*	ANOVA *F*[a]
		Noncorrected ratings		
Skill task:				
T1T2	ED	2.40	1.60	1.54
	RD	2.30	1.87	
	NDP	1.70	1.84	
	NDN	2.95	2.04	
ATE	ED	6.15	2.39	2.51
	RD	6.30	3.01	
	NDP	7.85	2.30	
	NDN	7.50	1.73	
TCE	ED	11.60	6.32	
	RD	11.75	7.94	
	NDP	7.35	6.63	
	NDN	12.10	7.06	
Chance task:				
T1T2	ED	1.10	.91	.82
	RD	.55	1.00	
	NDP	.90	1.62	
	NDN	1.00	1.08	
ATE	ED	4.65	2.01	3.13*
	RD	4.10	2.29	
	NDP	6.10	2.95	
	NDN	4.30	1.69	
TCE	ED	9.05	5.30	1.50
	RD	6.75	5.98	
	NDP	5.55	5.50	
	NDN	6.50	4.85	

Table 12 (Continued)

Measure	Group	M	SD	ANOVA F^a
		Corrected ratings		
Skill task:				
T1T2	ED	4.25	1.52	.29
	RD	4.29	1.97	
	NDP	4.40	1.30	
	NDN	4.69	1.69	
ATE	ED	4.54	2.42	2.12
	RD	4.86	2.66	
	NDP	5.87	2.34	
	NDN	6.08	1.72	
TCE	ED	9.26	5.63	2.07
	RD	9.43	6.14	
	NDP	5.65	4.97	
	NDN	9.24	6.00	
TCO	ED	3.16	4.12	1.86
	RD	2.89	2.92	
	NDP	4.70	3.78	
	NDN	2.24	2.65	
Chance task:				
T1T2	ED	2.02	.80	1.76
	RD	1.39	1.00	
	NDP	2.08	1.42	
	NDN	1.97	.98	
ATE	ED	1.22	1.67	2.98*
	RD	1.59	1.27	
	NDP	2.58	2.23	
	NDN	1.32	1.01	
TCE	ED	7.07	4.87	1.77
	RD	6.57	5.20	
	NDP	4.16	3.15	
	NDN	5.67	3.61	
TCO	ED	4.57	4.27	1.28
	RD	3.50	2.42	
	NDP	5.22	4.62	
	NDN	3.29	2.56	

[a] $df = 3, 76$.
*$p < .05$.

Table 13

One-way Analyses of Variance of Expectancy Measures Using "Skill Task Minus Chance Task" Difference Corrected Ratings

Source	SS	df	MS	F
Expectancy change from Trial 1 to Trial 2 (T1T2)				
Between groups	6.12	3	2.04	.64
Within groups	240.73	76	3.17	
Total	246.85	79		
After task expectancy (ATE)				
Between groups	32.43	3	10.81	2.47[t]
Within groups	323.23	76	4.25	
Total	355.66	79		
Total expectancy change in expected direction (TCE)				
Between groups	48.29	3	16.10	.53
Within groups	2,302.21	76	30.29	
Total	2,350.50	79		
Total expectancy change in opposite direction (TCO)				
Between groups	10.28	3	3.43	.28
Within groups	917.57	76	12.07	
Total	927.85	79		

[t]Trend ($p < .10$).

summarizes the results. Only on ATE was the between group effect marginally significant, $F(3, 74) = 2.47$, $p < .10$. All other measures failed to yield significant between-group differences.

Since the Nondepressed Normal group had a higher level of intelligence than the other three groups, analyses of covariance (ANCOVA) were conducted to see if such an inequality contributed to variations in the dependent measures. The results are summarized in Table 14. Just like ANOVA findings, none of the Group X Task interactions was significant, and all Task effects were highly significant. Therefore, the inequality of intelligence between groups did not seem to change the basic findings.

Moreover, orthogonal comparisons ($df = 76$, two-tailed and Tukey-HSD multiple range tests were used to provide more refined analyses of the "skill task minus chance task" difference corrected expectancy scores, as reported in Table 15. Only ATE showed a significant value, $t(76) = 2.26$, $p < .05$, between the Nondepressed Psychiatric group and the Nondepressed Normal group. All others were non-significant. Further, no significantly different subsets were identified by the multiple range test for all four measures.

As shown in Table 16, one-way ANOVA, orthogonal comparisons, and Tukey tests applied to noncorrected "skill minus chance" difference scores gave very similar results to those applied to corrected scores.

Since the initial expectancy measure ANOVA revealed that the

Table 14

4 Groups X 2 Tasks Analyses of Covariance of the Expectancy Measures Using Intelligence (CWIQ) as Covariate

Measure	Source	SS	df	MS	F
T1T2	Constant	14.91	1	14.91	6.52*
	Groups	3.55	3	1.18	.52
	Intelligence	.54	1	.54	.24
	Residual	171.57	75	2.29	
	Tasks	258.70	1	258.70	163.35**
	Groups X Tasks	3.06	3	1.02	.64
	Residual	120.36	76	1.58	
ATE	Constant	10.49	1	10.49	1.80
	Groups	34.27	3	11.42	1.96
	Intelligence	3.64	1	3.64	.62
	Residual	438.05	75	5.84	
	Tasks	536.23	1	536.23	252.16**
	Groups X Tasks	16.22	3	5.41	2.54
	Residual	161.62	76	2.13	
TCE	Constant	144.13	1	144.13	3.98*
	Groups	264.28	3	88.09	2.43
	Intelligence	2.49	1	2.49	.07
	Residual	2,717.13	75	36.23	
	Tasks	255.56	1	255.56	16.87**
	Groups X Tasks	24.14	3	8.05	.53
	Residual	1,151.11	76	15.15	
TCO	Constant	191.20	1	191.20	10.66**
	Groups	111.76	3	37.25	2.08
	Intelligence	71.80	1	71.80	4.00*
	Residual	1,345.09	75	17.94	
	Tasks	32.16	1	32.16	5.33*
	Groups X Tasks	5.14	3	1.71	.28
	Residual	458.78	76	6.04	

* $p < .05$.
** $p < .01$.

Table 15

Means, Standard Deviations, and Statistical Results of Corrected "Skill Task Minus Chance Task" Difference Expectancy Ratings

Measure	Group	*M*	*SD*	Orthogonal comparison Contrast[a]	*t*[b]	Tukey-HSD multiple range test[c]
T1T2	ED	2.23	1.47	1	-.12	RD > NDN > NDP > ED
	RD	2.91	1.97	2	1.20	
	NDP	2.32	1.61	3	.69	
	NDN	2.71	2.01			
ATE	ED	3.33	2.09	1	1.59	NDN > ED > NDP > RD
	RD	3.26	2.11	2	-.10	
	NDP	3.29	1.99	3	2.26*	
	NDN	4.76	2.05			
TCE	ED	2.19	4.66	1	.01	NDN > RD > ED > NDP
	RD	2.86	7.55	2	.39	
	NDP	1.49	4.37	3	1.20	
	NDN	3.58	4.84			
TCO	ED	-1.41	3.69	1	.29	NDP > RD > NDN > ED
	RD	-0.61	3.94	2	.73	
	NDP	-0.52	3.15	3	-.49	
	NDN	-1.05	3.04			

[a] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.

[b] Two-tailed test with *df* = 76, or less if corrected for lack of homogeneity of variance.

[c] Homogeneous subsets are underlined.

*$p < .05$.

Table 16

Statistical Results of Noncorrected "Skill Task Minus Chance Task" Difference Expectancy Ratings

Measure	ANOVA F[a]	Orthogonal Comparison Contrast[b]	t[c]	Tukey-HSD multiple range test[d]
T1T2	1.41	1	.35	NDN > RD > ED > NDP
		2	-.74	
		3	-1.89*	
ATE	2.02	1	-1.19	NDN > RD > NDP > ED
		2	-.94	
		3	-1.94*	
TCE	1.56	1	.05	NDN > RD > ED > NDP
		2	-1.12	
		3	-1.91*	

[a] $df = 3, 76$.

[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.

[c] Two-tailed test with $df = 76$, or less if corrected for lack of homogeneity of variance.

[d] Homogeneous subsets are underlined.

*$p < .10$.

inequality of initial expectancy across groups was due to the scores of the Nondepressed Psychiatric group, a 3 Groups by 2 Tasks ANOVA using noncorrected expectancy scores, with the NDP group excluded was carried out. The results, as presented in Table 17, showed that even with the nondepressed group removed intentionally, only the Task effect was significant in the measures T1T2, ATE, and TCE.

In addition, one-way ANOVA, orthogonal comparisons, and multiple range tests applied to noncorrected scores with the NDP group excluded (Table 18) also produced the same overall result pattern.

In addition, correlational analyses were conducted to examine the measures. Correlation coefficients were calculated to examine the relationship between the Beck Depression Inventory and the expectancy measures. As presented in Table 19, the only significant correlation consistent with the prediction of learned helplessness was the skill task ATE measure using corrected ratings, $r(79) = -.29$, $p < .01$. All other correlations were either nonsignificant or opposite to the predicted direction. For instance, the correlation with skill task TCE measure using corrected ratings was significant but positive, $r(79) = .19$, $p < .05$; while the predicted correlation was negative for all skill task measures. Also, there were two significant correlations in chance task measures, ATE and TCE; while no correlation was predicted for chance task measures. Further, examination of the coefficients calculated separately for the depression groups and the nondepression groups revealed no pattern or trend.

Table 17

3 Groups X 2 Tasks Analyses of Variance Using Noncorrected Expectancy Ratings, with the Nondepressed Psychiatric Group Excluded

Measure	Source	SS	df	MS	F
T1T2	Groups	6.12	2	3.06	1.23
	Subjects within groups	142.25	57	2.50	
	Between subjects	148.37	59		
	Tasks	83.33	1	83.33	43.80*
	Groups X Tasks	2.22	2	1.11	.58
	Tasks X Subjects within groups	108.45	57	1.90	
	Within subjects	194.00	60		
ATE	Groups	10.40	2	5.20	.69
	Subjects within groups	430.60	57	7.55	
	Between subjects	441.00	59		
	Tasks	158.70	1	158.70	65.69*
	Groups X Tasks	14.60	2	7.30	3.02
	Tasks X Subjects within groups	137.70	57	2.42	
	Within subjects	311.00	60		
TCE	Groups	29.45	2	14.72	.26
	Subjects within groups	3,229.18	57		
	Between subjects	3,258.63	59		
	Tasks	576.40	1	576.40	24.65*
	Groups X Tasks	52.23	2	26.12	1.12

Table 17 (Continued)

Measure	Source	SS	df	MS	F
	Tasks X Subjects within groups	1,332.88	57	23.38	
	Within subjects	1,961.50	60		

Note. The cell means were:

		Skill	Chance
For T1T2	ED	2.40	1.10
	RD	2.30	.55
	NDN	2.95	1.00
For AFT,	ED	6.15	4.65
	RD	6.30	4.10
	NDN	7.50	4.30
For TC,	ED	11.60	9.05
	RD	11.75	6.75
	NDN	12.10	6.50

*$p < .0001$.

Table 18

Statistical Results for 3 Groups (NDP Excluded) Using Noncorrected "Skill Task Minus Chance Task" Difference Expectancy Ratings

Measure	ANOVA F[a]	Orthogonal comparisons Contrast[b]	t[c]	Tukey-HSD multiple range test[d]
T1T2	.58	1	-.73	NDN > RD > ED
		2	.80	
ATE	3.02	1	-1.01	NDN > RD > ED
		2	2.24*	
TCE	1.12	1	-1.12	NDN > RD > ED
		2	.99	

[a] $df = 2, 57$.

[b] 1 = ED vs. RD; 2 = (ED & RD) vs. NDN.

[c] Two-tailed test with $df = 57$, or less if corrected for lack of homogeneity of variance.

[d] Homogeneous subsets are underlined.

*$p < .10$.

Table 19

Correlation Between Beck Depression Inventory Scores and Corrected/Noncorrected Expectancy Ratings

Expectancy measure	Depression & nondepression groups (n = 80)	Depression groups (n = 40)	Nondepression groups (n = 40)
	Corrected ratings		
Skill task			
T1T2	-.12	-.08	-.19
ATE	-.29**	-.16	.01
TCE	.19*	.20	-.11
TCO	-.02	.00	.46**
Chance task			
T1T2	-.16	-.08	-.08
ATE	-.22*	-.23	-.15
TCE	.24*	.16	-.10
TCO	-.07	-.19	.05
	Noncorrected ratings		
Skill task			
T1T2[a]	.00	.07	-.24
ATE	-.33**	-.20	.04
TCE	.16	.14	.00
Chance task			
T1T2[a]	-.03	.13	-.03
ATE	-.25*	-.29*	-.18
TCE	.21*	.19	.04

Note. Pearson product-moment correlation coefficients using one-tailed tests.

[a]Partial correlation with initial expectancy held constant.

*$p < .05$.

**$p < .01$.

The results, therefore, did not support Hypotheses 3a and 3b.

Summary. Although the same set of data was analysed by different procedures, the overall pattern of results remained unchanged. The same conclusion was reached from the following procedures:

1. Use of corrected or noncorrected scores.

2. Use of "skill task minus chance task" difference scores.

3. Use of ANCOVA to deal with the inequality of intelligence level between groups created by the Nondepressed Normal group.

4. Analyses of the scores of only three groups with the Nondepressed Psychiatric group (NDP) excluded.

5. Comparisons of groups on the additional dependent measure, Total Expectancy Change in Opposite Direction (TCO).

6. Use of orthogonal comparisons and multiple range tests to examine the relationships between groups.

7. Correlational analyses aiming at the assessment of the relationship between Beck Depression Inventory and the expectancy measures. All these analyses indicated that hypotheses 1 to 4 concerning expectancy changes in skill and chance tasks were not supported by the data.

Psychomotor and Perceptual Speed Tasks (Hypotheses 5a, 5b, and 5c)

Psychomotor speed tasks. A multivariate analysis of variance (MANOVA) including all the five psychomotor speed tests showed that there was an overall group difference, Rao's Approximate F test using Wilk's Lambda, $F(15, 199.2) = 2.36$, $p < .005$.

Table 20 presents the means, standard deviations, ANOVA F values, orthogonal comparison t values, and Tukey-HSD multiple range significant subset structures of the psychomotor variables. One-way ANOVA results showed that significant group differences existed for Digit Symbol (DS), Tapping Speed (TS), and Complex Reaction Time, Level 2 (CRT2), and that marginally significant differences between groups were found in Simple Reaction Time (SRT), and Complex Reaction Time, Level 1 (CRT1). Orthogonal comparisons and multiple range tests revealed that the significant group difference obtained in DS was not the result of a depression-versus-nondepression difference, but that of the unexpected slow performance of the Non-depressed Psychiatric group. Otherwise, the trend was quite clear. The basic factor was the varying level of depression, and the Endogenous Depression group was consistently slower in all tasks than the Reactive Depression group.

Owing to the deviation of the DS test results from those of the other psychomotor tests, a 4 Groups X 5 Lines ANOVA (Table 21) was carried out, followed by trend analyses of the five DS lines (Table 22). The ANOVA revealed a highly significant Line effect,

Table 20

Statistical Results of Psychomotor Variables

Test	Group	M	SD	ANOVA F[a]	Orthogonal Contrast[b]	Comparison t[c]	Tukey-HSD multiple range test[d]
Digit Symbol (DS)	ED	97.70	54.49	5.05**	1	0.72	NDP > ED > RD > NDN
	RD	77.35	33.20		2	1.43	
	NDP	104.00	52.80		3	3.82***	
	NDN	57.60	12.67				
Tapping Speed (TS)	ED	295.90	78.50	6.66***	1	-3.13**	NDN > NDP > RD > ED
	RD	356.35	71.01		2	-2.71**	
	NDP	356.65	78.24		3	-1.69[t]	
	NDN	394.50	51.41				
Simple Reaction Time (SRT)	ED	184.65	138.87	2.16[t]	1	1.88[t]	ED > RD > NDP > NDN
	RD	142.45	52.20		2	1.27	
	NDP	134.35	43.40		3	.65	
	NDN	126.60	30.52				
Complex Reaction Time-Level 1 (CRT1)	ED	442.50	543.35	2.59[t]	1	1.85[t]	ED > RD > NDP > NDN
	RD	260.30	93.76		2	1.48	
	NDP	244.30	42.18		3	1.22	
	NDN	229.20	35.62				
Complex Reaction Time-Level 2 (CRT2)	ED	1,319.10	1,817.38	3.20*	1	2.13*	ED > RD > NDP > NDN
	RD	677.65	344.62		2	1.55	
	NDP	656.65	385.35		3	2.19*	
	NDN	434.05	240.72				

[a] $df = 3, 76$.
[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.
[c] Two-tailed tests with $df=76$, or less if corrected for lack of homogeneity of variance.
[d] Homogeneous subsets are underlined.
[t] Trend ($p < .10$).
*$p < .05$.
**$p < .01$.
***$p < .001$.

Table 21

4 Groups by 5 Digit Symbol Lines

Analysis of Variance

Source	SS	df	MS	F
Groups	5,315.24	3	1,771.75	5.05*
Subjects within groups	26,675.56	76	350.99	
Between groups	31,990.56	79		
Lines	8,220.63	4	2,055.16	60.88**
Groups X Lines	2,290.16	12	190.85	5.65**
Lines X Subjects within groups	10,262.38	304	33.76	
Within subjects	20,773.25	320		

*$p < .01$.
**$p < .00001$.

Table 22

Trend Analyses for the 5 Digit Symbol Lines

Source	SS	df	MS	F
Lines -- Linear	6,560.85	1	6,560.85	194.35**
-- Quadratic	1,035.65	1	1,035.65	30.68*
Lines X Subjects within groups	10,262.38	304	33.76	

Note. The means of the 5 lines were:

Line 1: 8.30
Line 2: 17.14
Line 3: 17.43
Line 4: 20.23
Line 5: 21.08

*$p < .01$.
**$p < .001$.

$F(4, 304) = 60.88$, $p < .00001$, and Group X Line interaction, $F(12, 304) = 5.65$, $p < .00001$. The Line effect showed both the linear and the quadratic trends. Their significance levels were $F(1, 304) = 194.35$, $p < .001$, and $F(1, 304) = 30.68$, $p < .01$, respectively. Diagramatic representation of the Line means for the Groups (Figure 1) makes it clear that the significant group-trend interaction was produced by the scores of the Nondepressed Psychiatric group. There was a gradual decrease in psychomotor speed, as confirmed by the tests, in all the groups. Unexpectedly, in the NDP group, the rate of the speed decrease was greater. It should be noted that because of the structure of the DS test used (Line 1 shorter than the other lines, thus requiring less time to complete), the Line effect was somewhat inflated. But the relative standing of the groups and the general trend of performance were still there.

Further information about the other psychomotor variables was obtained by conducting a 4 Groups X 3 Trials ANOVA for Tapping Speed (TS), and a 4 Groups X 3 Reaction Times (RT) Levels X 6 Trials ANOVA. The TS ANOVA (Table 23) yielded a significant Trial effect, $F(2, 152) = 27.92$, $p < .00001$, but a nonsignificant Group X Trial interaction, $F(6, 152) = .63$, $p > .05$. Thus, all groups varied similarly in tapping speed across all trials. The RT ANOVA (Table 24) yielded significance in all main effects: Group effect, $F(3, 76) = 3.22$, $p < .05$; Reaction Time Complexity Level effect, $F(2, 152) = 36.95$, $p < .00001$; Trial effect, $F(5, 380) = 7.62$, $p < .0001$; and the following significant interactions: Group X Level interaction,

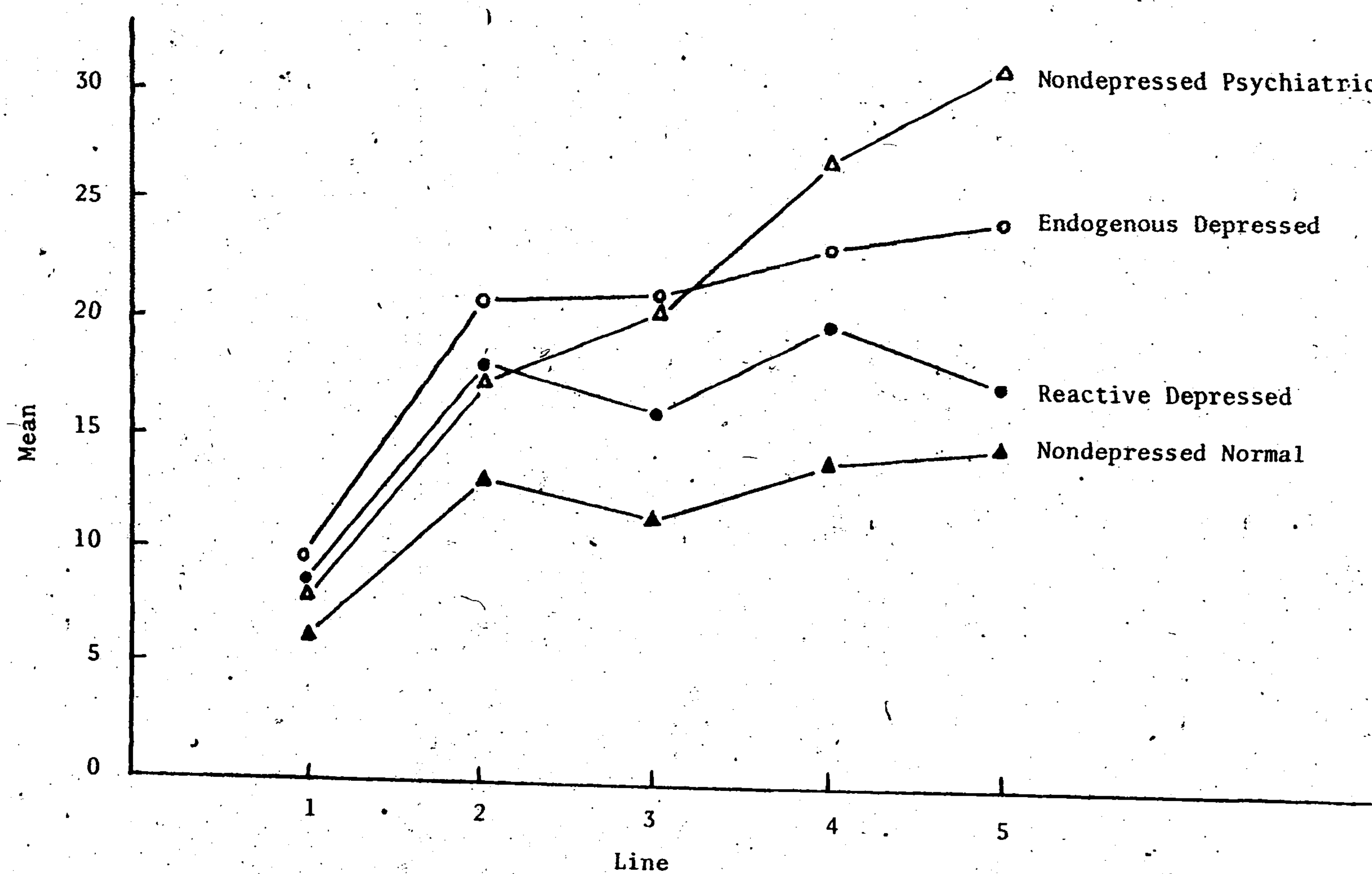

Figure 1. Digit Symbol Substitution: Means (in Seconds) of Each Group for Each Line

Table 23

4 Groups by 3 Tapping Speed Trials

Analysis of Variance

Source	SS	df	MS	F
Groups	33,258.77	3	11,086.26	6.66*
Subjects within groups	126,467.00	76	1,664.04	
Between subjects	159,723.00	79		
Trials	4,703.75	2	2,351.88	27.92**
Groups X Trials	316.25	6	52.71	.63
Trials X Subjects within groups	12,803.00	152	84.23	
Within subjects	17,821.00	160		

*$p < .001$.
**$p < .00001$.

Table 24

4 Groups by 3 Reaction Time Levels by 6 Trials

Analysis of Variance

Source	SS	df	MS	F
Groups	850,968	3	283,656.00	3.22*
Subjects within groups	6,686,035	76	87,974.13	
Between subjects	7,537,003	79		
Reaction Time Levels	2,845,980	2	1,422,990.00	36.95****
Groups X Levels	707,716	6	117,952.63	3.06**
Levels X Subjects within groups	5,853,720	152	38,511.31	
Within subjects	15,523,000	1,360		
Trials	205,795	5	41,159.00	7.62***
Groups X Trials	29,968	15	1,997.87	.37
Trials X Subjects within groups	2,053,306	380	5,403.43	
Levels X Trials	265,959	10	26,595.90	5.80****
Groups X Levels X Trials	76,273	30	2,542.43	.55
Levels X Trials X Subjects within groups	3,484,288	760	4,584.59	

*$p < .05$.
**$p < .01$.
***$p < .0001$.
****$p < .00001$.

$F(10, 760) = 5.80$, $p < .00001$. These results indicated that the groups differed in their tapping speed, that there was a complexity level effect, and that the speed across trials was different. Further, these suggested depressed patients, especially the endogenous depressives, showed more psychomotor retardation in more complex reaction time tasks than in simpler ones.

Figure reversal perceptual speed tasks. Another MANOVA involving all the perceptual speed figure reversal tests did not produce a significant overall group difference, Rao's Approximate F test using Wilk's Lambda, $F(18, 164.5) = 1.25$, $p > .05$. Individual one-way ANOVA applied to the dependent measures employed also failed to provide any significant differences or trends (Table 25).

Correlational analyses. Pearson product-moment correlation coefficients were calculated to examine the relationship between the BDI and the psychomotor and perceptual speed variables (Table 26). They showed that only Tapping Speed was correlated positively with the depth of depression, $r(79) = -.26$, $p < .01$. (The coefficient is negative because a low TS score means low psychomotor speed.) No correlation existed for other variables, using all 80 subjects, only the depression groups, or only the nondepression groups.

Summary. Hypothesis 5a was partially supported. Correlational analyses indicated that the intensity of depression measured by the BDI was only related to Tapping Speed. Hypotheses 5b and 5c were partially supported. Four of the five psychomotor speed measures suggested that the depressed subjects were slower than the

Table 25

Means, Standard Deviations, and Analyses of Variance of Figure Reversal Measures

Measure[a]	Group	M	SD	ANOVA F
NCBR	ED	39.00	13.41	.37
	RD	35.33	16.95	(df=3, 68)
	NDP	38.89	15.01	
	NDN	42.95	33.76	
NCBD	ED	67.22	32.99	1.81
	RD	70.25	19.93	(df=3, 68)
	NDP	69.50	14.26	
	NDN	55.31	22.75	
VFCR	ED	64.65	35.65	.23
	RD	58.35	28.89	(df=3, 68)
	NDP	57.47	28.46	
	NDN	56.90	30.65	
VFCD	ED	68.34	25.93	1.81
	RD	89.02	25.49	(df=3, 69)
	NDP	84.30	28.31	
	NDN	84.45	30.80	
NCCR	ED	48.25	20.69	.90
	RD	38.37	18.13	(df=3, 70)
	NDP	42.95	14.94	
	NDN	42.10	17.62	
NCCD	ED	71.78	21.52	1.71
	RD	73.33	20.32	(df=3, 70)
	NDP	74.75	20.72	
	NDN	61.34	20.09	

[a]NCBR = Necker Cube (Box) Rate; NCBD = Necker Cube (Box) Duration; VFCR = Vase-Face (Card) Rate; VFCD = Vase-Face (Card) Duration; NCCR = Necker Cube (Card) Rate; NCCD = Necker Cube (Card) Duration.

Table 26

Correlation Between Beck Depression Inventory Scores and Psychomotor/Perceptual Speed Measures

Measure	Depression & Nondepression groups ($n \leq 80$)	Depression groups ($n \leq 40$)	Nondepression groups ($n \leq 40$)
DS	.11	.01	.35*
TS	-.26**	.16	-.11
SRT	.15	-.16	.19
CRT1	.18	-.04	.23
CRT2	.18	-.11	.10
Necker Cube (Box)			
Rate	-.10	.03	-.12
Duration	.14	.08	-.11
Vase-Face (Card)			
Rate	.03	-.13	-.02
Duration	-.10	-.09	.10
Necker Cube (Card)			
Rate	.05	.16	.03
Duration	.10	-.02	-.03

*$p < .05$.
**$p < .01$.

nondepressed. All five of them showed that the endogenous depressives were more retarded than the reactive depressives, although significantly so only on Tapping Speed. Perceptual speed measures did not yield any trend or pattern as predicted.

Expectancy Changes and Psychomotor Retardation (Hypotheses 6a and 6b)

The results of expectancy changes have shown that endogenous depressives and reactive depressives do not differ in their scores on the skill task. The results of the analysis of psychomotor speed measures have shown that endogenous depressives are always more retarded than reactive depressives, although statistically significant so only on one measure. Finally, correlational analyses indicated that the severity of depression correlated with only one psychomotor speed measure, and to some degree with the skill and chance expectancy changes, but in a way contrary to that predicted by the learned helplessness theory. Thus, a choice between the alternative hypotheses <u>6a</u> and <u>6b</u> cannot be made because of the general absence of significant depression-versus-nondepression differential expectancy changes. It appears that there is no basis to claim that reactive depression is primarily characterized by response-outcome independence and endogenous depression by psychomotor retardation. Neither can one claim that both of these symptoms are common to the severity of general depression.

Hostility (Hypotheses 7a and 7b)

The means, standard deviations, analysis of variance F values, orthogonal comparison t values, and Tukey-HSD multiple range test results of the Buss-Durkee Hostility and Guilt scores are presented in Table 27. On the Hostility Score, there was a significant group effect, $F(3, 76) = 7.73$, $p < .0001$. Orthogonal comparisons and multiple range tests indicated that the depressed groups were more hostile than the nondepressed groups, $t(76) = 4.48$, $p < .001$, and that the reactive depressives did not differ from the endogenous depressives, $t(76) = -.48$, $p > .05$. On the Guilt Score, the group effect was highly significant, $F(3, 76) = 10.16$, $p < .0001$. The depressed groups expressed more guilt than the nondepressed groups, orthogonal comparison $t(76) = 5.46$, $p < .001$. The results regarding hostility were contrary to the prediction of the learned helplessness theory; depressed subjects did not show less hostility than the nondepressed. Although not significantly so, reactive depressives scored in the more hostile direction than the endogenous depressives. This is also opposite to the prediction. Thus, both Hypotheses 7a and 7b were not supported. The higher level of guilt expressed by the depressed groups than the nondepressed is consistent with the symptomatology of depression.

Table 27

Means, Standard Deviations, and Statistical Results of the Buss-Durkee Scores

Score	Group	M	SD	ANOVA F[a]	Orthogonal comparison Contrast[b]	t[c]	Tukey-HSD multiple range test[d]
Hostility	ED	36.60	11.30	7.73**	1	4.48*	RD > ED > NDP > NDN
	RD	38.00	7.15		2	-.48	
	NDP	30.55	9.45		3	1.69	
	NDN	25.65	8.29				
Guilt	ED	6.60	1.54	10.16**	1	5.46*	ED > RD > NDP > NDN
	RD	6.15	1.18		2	1.04	
	NDP	4.10	2.29		3	-.22	
	NDN	4.25	2.00				

[a] df = 3, 76.

[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.

[c] Two-tailed test with df = 76, or less if corrected for lack of homogeneity of variance.

[d] Homogeneous subsets are underlined.

*$p < .001$.

**$p < .0001$.

External Locus of Control (Hypotheses 8a, 8b, and 8c)

The means, standard deviations, analysis of variance F values, orthogonal comparison t values, and Tukey-HSD multiple range test results of the Rotter I-E Externality score are given in Table 28. The ANOVA indicated a significant difference between the group means, $F(3, 76) = 5.17$, $p < .01$. Orthogonal comparison of the depressed-versus-nondepressed group means was significant, $t(76) = 3.53$, $p < .001$. Hypothesis 8c was therefore confirmed. However, the difference between the Endogenous Depressive subjects and the Reactive Depressive subjects was not significant, orthogonal comparison $t(76) = -.78$, $p > .05$. Hypothesis 8b was therefore not supported.

Pearson correlation coefficients between the I-E Externality score and the expectancy measures are shown in Table 29. The skill task ATE measure correlated significantly in the predicted direction with I-E scores, for all 80 subjects, $r(79) = -.30$, $p < .01$, and for 40 depressed subjects only, $r(39) = -.45$, $p < .01$. But at the same time, the skill task TCE measure correlated significantly in the opposite direction with I-E scores, for all 80 subjects, $r(79) = .25$, $p < .05$, and for 40 depressed subjects, $r(39) = .37$, $p < .01$. The skill task T1T2 and TCO measures had no correlation with I-E scores. In the chance task correlations were nonsignificant, except the ATE measure, for 80 subjects, $r(79) = -.26$, $p < .01$, and for 40 depressed subjects, $r(39) = -.33$, $p < .05$. Hypothesis 8a predicted that the more external a subject was, the less expectancy change he/she would

Table 28

Means, Standard Deviations, and Statistical Results of the Rotter Externality Score

Group	M	SD	ANOVA F[a]	Orthogonal comparison Contrast[b]	t^c	Tukey-HSD multiple range test[d]
ED	11.05	2.74	5.17*	1	3.53**	RD > ED > NDN > NDP
RD	12.00	4.36		2	-.78	
NDP	7.55	3.47		3	-1.57	
NDN	9.45	4.50				

[a] $df = 3, 76$.
[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.
[c] Two-tailed test with $df = 76$.
[d] Homogeneous subsets are underlined.
*$p < .01$.
**$p < .001$.

Table 29

Correlation between Rotter Externality Scores and Expectancy Change Measures (Corrected Ratings)

Measure	Depression & nondepression groups (n = 80)	Depression groups (n = 40)	Nondepression groups (n = 40)
Skill task:			
T1T2	-.11	-.06	-.12
ATE	-.30**	-.42**	-.01
TCE	.25*	.37**	.06
TCO	-.03	-.02	.02
Chance task:			
T1T2	-.06	-.16	.11
ATE	-.26**	-.33*	-.14
TCE	.07	-.05	.04
TCO	-.13	-.10	-.15

*$p < .05$.
**$p < .01$.

have, especially in the skill task. The overall pattern of correlations obtained did not support this hypothesis.

I[illegible]ough depressed subjects were more external in their locus o[illegible]he reactive depressives and the endogenous depressiv[illegible]iffer in their externality, and externality did not correlate w[illegible] expectancy changes in a manner consistent with the predictions of the learned helplessness theory.

Mood Change (Hypotheses 9a and 9b)

Table 6 (p.102) presents the means, standard deviations, analysis of variance *F* values, orthogonal comparison *t* values, and Tukey-HSD multiple range results of the four DACL mood measures. It is clear that the groups were different in their depressive mood, $F(3, 76) = 17.91, 19.09, 15.49, 9.15$, all p's $< .0001$, for the four occasions respectively. Further, such group differences were the result of the higher scores of the depressed groups as compared with the nondepressed groups, orthogonal comparison $t(76) = 7.19, 7.20, 6.47, 5.02$, all p's $< .001$, for the four occasions respectively. However, the endogenous reactive contrasts were not significant, orthogonal comparison $t(76) = 1.12, 1.64, 1.70, 1.38$, all p's $> .05$, for four occasions respectively.

The 4 Groups X 4 DACL Measures ANOVA (Table 30) confirmed the difference between groups found, $F(3, 76) = 21.19$, $p < .00001$. It also yielded significant DACL Occasion effect, $F(3, 228) = 4.92$, $p < .01$. This effect was primarily caused by the increase of depressive mood on the last measure occasion. The lack of Group X DACL Occasion interaction, $F(9, 228) = .85$, $p > .05$, means that the groups did not differ in their mood change across measure occasions.

Hypothesis 9a was therefore supported; the depressed subjects showed more depressive mood than the nondepressed subjects. But Hypothesis 9b was not supported; the reactive depressives did not show more mood change than the endogenous. In fact, both depressed groups did not show more mood change than the nondepressed groups.

Table 30

4 Groups X 4 DACL Occasions

Analysis of Variance

Source	SS	df	MS	F
Groups	5,661.57	3	1,887.19	21.19**
Subjects within groups	6,769.79	76	89.08	
Between subjects	12,431.39	79		
DACL	183.74	3	61.25	4.92*
Groups X DACL	95.67	9	10.63	.85
DACL X Subjects within groups	2,837.64	228	12.45	
Within subjects	3,117.00	240		

*$p < .01$.
**$p < .00001$.

Self-Rating of Performance (Hypothesis 10)

Table 31 presents the means, standard deviations, analysis of variance F values, orthogonal comparison t values, and Tukey-HSD multiple range test results of the self-ratings of performance. On both rating of present performance and rating of aspired-to performance, the depressed rated themselves lower than the nondepressed, $F(3, 76) = 7.61$, $p < .001$, and $F(3, 76) = 3.87$, $p < .05$, respectively. Hypothesis 10 was therefore confirmed.

Moreover, the reactive depressives did not differ from the endogenous depressives, nor did the nondepressed patients differ from the normal controls.

Table 31

Statistical Results for Self-Ratings of Performance

Measure	Group	M	SD	ANOVA F[a]	Orthogonal comparison: Contrast[b]	Orthogonal comparison: t[c]	Tukey-HSD multiple range test[d]
Self-rating of present performance	ED	3.85	.81	7.61***	1	-4.74***	NDP > NDN > ED > RD
	RD	3.75	.64		2	.45	
	NDP	4.60	.68		3	.45	
	NDN	4.50	.69				
Self-rating of aspired-to performance	ED	5.10	.79	3.87*	1	-3.18**	NDN > NDP > ED > RD
	RD	4.80	.62		2	1.08	
	NDP	5.50	.96		3	-.54	
	NDN	5.65	1.09				

[a] df = 3, 76.
[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.
[c] Two-tailed test with df = 76, or less if corrected for lack of homogeneity of variance.
[d] Homogeneous subsets are underlined.
*$p < .05$.
**$p < .01$.
***$p < .001$.

Personality Variables (Hypotheses 11 to 15)

Complete data were not obtained for some personality tests. The Minnesota Multiphasic Personality Inventory (MMPI) scores were available from 33 subjects only: 16 ED, 12 RD, and 5 NDP subjects. The Clinical Analysis Questionnaire (CAQ) scores were available for 63 subjects only: 13 ED, 14 RD, 18 NDP, and 18 NDN subjects. The inference one can draw from these two tests, particularly from the MMPI data, is limited.

The statistical analyses of the HDRS, LPD, and ZSDS were reported earlier in the "Validity of Diagnostic Procedures" section. They all discriminated between the depressed and the nondepressed groups. The means, standard deviations, analysis of variance F values, orthogonal comparison t values, and Tukey-HSD multiple range test results for the relevant scales of the MMPI and the CAQ are presented in Tables 32 and 33.

Hypothesis 11. The MMPI D scale (see Table 32) did not show any between-group difference, $F(2, 30) = 2.19$, $p > .05$. Since the NDP group had only five subjects with data available, it will not be included in the following discussion. Basing on the data available from 80% of the ED subjects and 60% of the RD subjects, one can say at least numerically the mean T-scores of these two depressed groups were above the usual $T = 70$ cut-off point for possible psychopathology. However, orthogonal comparison indicated that both groups were not different from each other, $t(30) = .81$, $p > .05$. The small number of

Table 32

Statistical Results of the MMPI D Scale

Group	M	SD	ANOVA F[a]	Orthogonal comparison: Contrast[b]	Orthogonal comparison: t[c]	Tukey-HSD multiple range test[d]
ED	79.44	15.50	2.19	1	NA	ED RD NDP
RD	75.08	12.18		2	.81	
NDP	64.40	13.05				

[a] df = 2, 30.

[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD.

[c] Two-tailed test with df = 30.

[d] Homogeneous subsets are underlined.

nondepressed subjects on whom MMPI data was obtained did not permit a depressed-versus-nondepressed comparison.

The CAQ one-way ANOVA (see Table 33) showed that highly significant between-group differences existed for all D scales ($p < .0001$), except for D3, which was marginal ($p < .10$). Orthogonal comparisons revealed that the source of such an overall between-group difference was to a great extent the difference between the depressed and the nondepressed groups, and to a lesser extent the difference between the NDP and the NDN subjects, except for D3, which was again marginally significant. Tukey-HSD results confirmed these findings. The endogenous depressives and the reactive depressives did not differ from each other. Similarly, the nondepressed patients did not differ from the normal controls. Numerically, the means of these four groups maintained a very consistent order: the ED group always had the highest mean score, followed by RD, then NDP, and finally NDN. Briefly, high scores on the CAQ D scales may be described as follows: D1 means high hypochondriasis, D2 suicidal disgust, D4 high anxious depression, D5 low energy depression, D6 high guilt and resentment, and D7 high bored withdrawal. For D3, the RD group had the lowest score, which means low brooding discontent or having little need for excitement. Except for D3, depressed subjects scored high on the D scales of CAQ.

The correlations between the BDI and the other depression and personality variables are presented in Table 34. The correlations between the BDI and the HDRS, LPD, and ZSDS were all significant,

Table 33

Statistical Results of Clinical Analysis Questionnaire D Scales

Scale	Group	M	SD	ANOVA F^a	Orthogonal Comparison Contrast[b]	t^c	Tukey-HSD Multiple Range Test[d]
D1	ED	15.54	5.16	39.70****	1	10.33***	ED > RD > NDP > NDN
	RD	13.00	2.88		2	1.56	
	NDP	5.22	3.81		3	2.39*	
	NDN	2.29	3.44				
D2	ED	14.54	5.32	37.96****	1	9.82***	ED > RD > NDP > NDN
	RD	14.14	6.44		2	.17	
	NDP	3.39	3.40		3	2.34*	
	NDN	1.18	2.07				
D3	ED	10.23	3.35	2.53^t	1	-1.76^t	NDP > ED > NDN > RD
	RD	8.86	3.21		2	.99	
	NDP	12.28	3.94		3	1.82^t	
	NDN	10.06	3.75				
D4	ED	14.15	4.14	22.63****	1	7.86***	ED > RD > NDP > NDN
	RD	13.50	3.50		2	.47	
	NDP	8.17	3.13		3	2.60*	
	NDN	5.00	3.69				
D5	ED	19.39	4.29	35.05****	1	10.02***	ED > RD > NDP > NDN
	RD	18.64	5.44		2	.41	
	NDP	8.72	4.99		3	2.36*	
	NDN	4.94	4.15				

Table 33 (Continued)

Scale	Group	M	SD	ANOVA F[a]	Orthogonal Comparison Contrast[b]	Orthogonal Comparison t[c]	Tukey-HSD Multiple Range Test[d]
D6	ED	16.92	4.59	35.69****	1	9.81***	ED > RD > NDP > NDN
	RD	14.64	2.62		2	1.55	
	NDP	8.28	4.61		3	3.23**	
	NDN	4.12	2.96				
D7	ED	10.15	3.51	14.90****	1	6.49***	RD > ED > NDP > NDN
	RD	10.29	3.89		2	-.09	
	NDP	5.22	3.75		3	1.71	
	NDN	3.12	3.39				

[a] df = 3, 58.
[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.
[c] Two-tailed test with df = 58, or less if corrected for lack of homogeneity of variance.
[d] Homogeneous subsets are underlined.
*$p < .05$.
**$p < .01$.
***$p < .001$.
****$p < .0001$.

Table 34

Correlation Between Beck Depression Inventory Scores and Other Depression Measures

Measure	Depression & Nondepression groups ($n \leq 80$)	Depression groups ($n \leq 40$)	Nondepression groups ($n \leq 40$)
Hamilton	.82***	.39**	.41*
Levine-Pilowsky	.90***	.59***	.34*
Zung	.91***	.75***	.25
MMPI-D	.4[illegible]	.30	-.15
CAQ-D1	.82***	.40*	.45**
CAQ-D2	.85***	.51**	.38*
CAQ-D3	-.27*	-.13	-.25
CAQ-D4	.71***	.21	.42**
CAQ-D5	.82***	.48**	.46**
CAQ-D6	.84***	.70**	.49**
CAQ-D7	.63***	.23	.04

*$p < .05$.
**$p < .01$.
***$p < .001$.

respectively: $r(59) = .82$, $p < .001$; $r(78) = .90$, $p < .001$; and $r(79) = .91$, $p < .001$. The correlations were lower but still significant when only the depressed subjects were considered: for HDRS, $r(39) = .39$, $p < .01$; for LPD, $r(39) = .59$, $p < .001$; and for ZSDS, $r(39) = .75$, $p < .001$.

The correlation coefficient between the BDI and the MMPI D scale was significant, for all subjects, $r(32) = .42$, $p < .01$, but nonsignificant if only depressed subjects were considered.

The correlation coefficients between the BDI and the CAQ D scales (except D3) were all highly significant, for all 63 subjects, $r(62)$ ranged from .63 to .85, all p's $< .001$. For D3 the correlation was lower but significant, $r(62) = -.27$, $p < .05$; the more depressed, the less need for excitement. If just the depressed subjects were considered, then only the coefficients for D1, D2, D5 and D6 were significant but somewhat lower, $r(26)$ ranged from .40 to .70, p ranged from $< .05$ to $< .001$. Similar results were found if just the nondepressed subjects were considered. For D1, D2, D4, D5, and D6, $r(35)$ ranged from .38 to .49, p ranged from $< .05$ to $< .001$.

In summary, Hypothesis 11 was supported by available data. The depth of depression measured by the Beck Depression Inventory correlated highly and consistently with that measured by other tests, notably the Hamilton, Levine-Pilowsky, and Zung scales, and most of the D scales of CAQ. The degree of correlation decreased moderately when only the depressed subjects were considered, probably because of the narrower range of scores among these subjects.

Hypothesis 12. The Reactive Depression group did not score higher on the MMPI D-S subscale and lower on the MMPI D-O subscale than the Endogenous Depression group (see Table 36). Although numerically the means of these two groups were in the predicted direction, both the orthogonal comparison and the Tukey range test showed that the group means were not different from each other. For D-S, orthogonal comparison t was -.08, $p > .05$; for D-O, orthogonal comparison t was 1.28, $p > .05$. Hypothesis 12 was therefore not supported.

Hypothesis 13. The Reactive Depression group did not score higher on the MMPI Dr scale than the Endogenous Depression group (see Table 35). Again, the RD group mean was numerically higher than that of the ED group, but statistical tests indicated a lack of significance, orthogonal comparison $t = -.82$, $p > .05$. Hypothesis 13 was therefore not supported.

Hypothesis 14. The statistical analyses of the Patient Description Form (PDF) were reported earlier in the "Validity of Diagnostic Procedures" section (see pages 101 to 104). The Reactive Depression group scored lower on the PDF than the Endogenous Depression group, orthogonal comparison $t(32) = 2.95$, $p < .01$. Hypothesis 14 was therefore supported.

Table 35

Means, Standard Deviations, and Statistical Results of the MMPI D-S, D-O, and Dr Scales

Scale	Group	M	SD	ANOVA F[a]	Orthogonal Comparison Contrast[b]	t[c]	Tukey-HSD Multiple range test[d]
D-S	ED	47.13	10.49	2.[illegible]	1	NA	NDP > RD > ED
	RD	47.42	8.25		2	-.08	
	NDP	56.60	9.04		3	NA	
D-O	ED	81.25	13.09	7.57	1	NA	ED > RD > NDP
	RD	75.17	11.64		2	1.28	
	NDP	56.40	12.28		3	NA	
Dr	ED	20.13	5.56	.35	1	NA	RD > NDP > ED
	RD	21.58	3.70		2	-.82	
	NDP	21.20	3.27		3	NA	

[a] df = 2, 30.

[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.

[c] Two-tailed test with df = 30, or less if corrected for lack of homogeneity of variance.

[d] Homogeneous subsets are underlined.

Hypothesis 15. The EPQ results (Table 36) showed that marginal between-group difference occurred on Psychoticism, and significant between-group differences on Extraversion and Neuroticism. Orthogonal comparisons pointed out that such between-group differences were due to the lower Extraversion (i.e., higher Introversion) scores and higher Neuroticism scores of the depressed subjects than the non-depressed subjects. For Extraversion, orthogonal comparison t was -4.2[illegible], $p < .001$; for Neuroticism, orthogonal comparison t was 8.55, $p < .001$. There was no trend or pattern with significance on Psychoticism and Lie scales. The Reactive Depression group did not score lower on Psychoticism and higher on Neuroticism than the Endogenous Depression group. However, both groups scored similarly on Extraversion, orthogonal comparison $t = .36$, $p > .05$. Thus, Hypothesis 15 was only partially supported.

Table 36

Statistical Results of Eysenck Personality Questionnaire Scales

Scale	Group	M	SD	ANOVA F[a]	Orthogonal Comparison Contrast[b]	t^c	Tukey-HSD Multiple range test[d]
Psychotism (P)	ED	3.95	3.12	2.67	1	1.60	RD > NDP > ED > NDN
	RD	5.20	3.22		2	-1.41	
	NDP	4.40	2.50		3	1.86	
	NDN	2.75	2.25				
Extraversion (E)	ED	9.45	5.61	6.14*	1	-4.28*	NDN > NDP > ED > RD
	RD	8.85	4.79		2	.36	
	NDP	14.20	5.28		3	.00	
	NDN	14.20	5.42				
Neuroticism (N)	ED	19.60	3.68	24.33**	1	8.35*	ED > RD > NDP > NDN
	RD	18.70	3.76		2	.63	
	NDP	11.95	5.72		3	1.72	
	NDN	9.50	4.61				
Lie (L)	ED	7.95	3.97	2.16	1	-.70	NDN > ED > NDP > RD
	RD	5.75	3.21		2	1.75	
	NDP	6.40	4.60		3	-1.71	
	NDN	8.55	4.02				

[a] df = 3, 76.
[b] 1 = (ED & RD) vs. (NDP & NDN); 2 = ED vs. RD; 3 = NDP vs. NDN.
[c] Two-tailed test with df = 76, or less if corrected for lack of homogeneity of variance.
[d] Homogeneous subsets are underlined.
*$p < .001$.
**$p < .0001$.

Correlational Analyses

Severity of depression. The Beck Depression Inventory, which was used as a measure of the severity of depression and for subject assignment, was correlated with demographic variables, depression variables not discussed before, personality variables, and self-ratings of performance. As shown by Table 37, the BDI had low negative correlation with education and IQ, respectively, $r(79) = -.25$, $p < .05$, and $r(79) = -.32$, $p < .01$. This was likely due to the higher education and intelligence level of the nondepressed normal subjects. However, correlation with age was not significant.

For the MMPI scales, the positive correlation between the BDI and the Depression-Obvious (D-O) scale, $r(32) = .63$, $p < .001$, and the negative correlation with the Depression-Subtle (D-S) scale, $r(32) = -.44$, $p < .01$, seemed to agree with Wiener and Harman's suggestion (cf. Hypothesis 12, p. 73) that subjects having more severe forms of psychopathology tended to score high on D-O, while those with milder forms of maladjustment tended to score high on D-S. Such a pattern appeared to remain when either only the depressed groups or only the nondepressed groups were considered, although some of the correlation coefficients were nonsignificant. Finally, there was no correlation between the BDI and the Dr scale.

There was a low positive correlation between the BDI and the Patient Description Form (PDF), $r(59) = .23$, $p < .05$. But the correlation became nonsignificant when only the depressed subjects or

Table 37

Correlation of Beck Depression Inventory Scores with Demographic, Depression, Personality, and Self-Rating of Performance Measures

Measure	Depression & nondepression groups (n ≤ 80)	Depression groups (n ≤ 40)	Nondepression groups (n ≤ 40)
Age	.12	-.05	-.07
Education	-.25*	.05	-.22
IQ	-.32**	.10	-.25
MMPI-DO	.63***	.40*	.35
MMPI-DS	-.44**	-.29	-.95**
MMPI-DR	[illegible]	-.25	.29
PDF	[illegible]	-.03	.17
DACL-1	.67***	.32*	.18
DACL-2	.65***	.32*	-.07
DACL-3	.68***	.53***	.04
DACL-4	.53***	.27*	.03
Rotter	.40***	.19	.21
BDHI (Hostility)	.55***	.44*	.42**
BDHI (Guilt)	.57***	.25	.40**
EPQ-P	.25*	.29*	.08
EPQ-E	-.46***	-.18	-.14
EPQ-N	.72***	[illegible]	.49***
EPQ-L	-.10	.00	-.23
Self-Rating			
(Present)	-.54***	-.36*	-.25
(Aspired-to)	-.31**	.06	-.06

*p < .05.
**p < .01.
***p < .001.

only the nondepressed subjects were analysed. Thus, one cannot claim that high endogenicity and high depression are related.

The correlations between the BDI and the DACL depressive mood measures were all moderately high; for all 80 subjects, $r(79)$ ranged from .53 to .68, all p's $< .001$. When just the 40 depressed subjects were examined, the correlation dropped to a low but still significant level; $r(39)$ ranged from .27 to .53, and p's from $< .05$ to $< .001$.

A moderately low correlation between the BDI and the Rotter Externality scores was found, $r(79) = .40$, $p < .001$. The tendency was that the more depressed a subject was, the more external his/her perceived locus of control was. Such a finding was weakened somewhat by the fact that correlation coefficients for only the depression groups or only the nondepression groups were nonsignificant.

The relationship between depression (BDI scores) and hostility (BDHI scores) was quite clear. A moderately high correlation was found: for 80 subjects, $r(79) = .55$, $p < .001$; for 40 depressed subjects, $r(39) = .44$, $p < .01$; and for 40 nondepressed subjects, $r(39) = .42$, $p < .01$. The more depressed a subject was, the more hostility he/she expressed. A similar level of relationship existed between depression and guilt (BDHI scores), although nonsignificantly so among the depressed subjects: for 80 subjects, $r(79) = .57$, $p < .001$; for 40 depressed subjects, $r(39) = .25$, $p > .05$; and for 40 nondepressed subjects, $r(39) = .40$, $p < .01$. The more depressed a subject was, the more guilt he/she tended to express.

Significant correlations between the BDI and the Eysenck Personality Questionnaire (EPQ) scales were as follows: Psychoticism (P), for 80 subjects, $r(79) = .25$, $p < .05$, and for 40 depressives, $r(39) =$ [illegible], $p < .05$; Extraversion (E), for 80 subjects, $r(79) = -.46$, $p < .001$; and Neuroticism (N), for 80 subjects, $r(79) = .72$, $p < .001$, for 40 depressives, $r(39) = .34$, $p <$ [illegible], and for 40 nondepressives, $r(39) = .49$, $p < .001$. The more depressed a patient was, the higher were his/her scores on Psychoticism and Neuroticism, but the lower his/her scores on Extraversion (i.e., higher on Introversion). There was no correlation with the Lie (L) scale.

The degree of depression related to the self-ratings of performance as follows: Moderately high negative correlation between the BDI and self-rating of present performance, $r(79) = -.54$, $p < .001$, and moderately low negative correlation between the BDI and self-rating of aspired-to performance, $r(79) = -.31$, $p < .01$. The more depressed a subject was, the lower rating he/she gave himself/herself about his/her performance.

<u>Age</u>. Age was correlated with selected variables (Table 38). Near-zero correlation existed between age and expectancy change measures, the figure reversal measures, and the self-ratings of performance. Moderately low correlations were found for all psychomotor speed variables. The correlations increased slightly to a moderately high level when only the depression groups were considered. It should be pointed out that the correlation with Tapping Speed was negative, because a low TS score meant psychomotor retardation, while the reverse was true for the other measures. Thus, the older the subjects were, the more psychomotor retardation they exhibited. Consequently, an analysis of covariance for psychomotor variables using age as a covariate was conducted to determine if the groups still differed from one another when the effect of age was statistically controlled. As shown in Table 39, there were significant Group effects for DS, $F(3, 75) = 5.34$, $p < .01$; and for TS, $F(3, 75) = 5.59$, $p < .01$. Both SRT and CRT1 had no significant Group effect; while CRT2 had marginally significant Group effect, $F(3, 75) = 2.16$, $p < .10$. When compared with the ANOVA results presented earlier (pp. 128 to 130, Table 20), it can be seen that when the age effect was controlled, the marginal significance for SRT and CRT1 disappeared; and the group difference for CRT2 became marginally significant. Thus, it appears that psychomotor speed was affected both by depression and age.

Table 38

Correlation between Age and Selected Variables

Variable	Depression & nondepression groups ($n \leq 80$)	Depression groups ($n \leq 40$)	Nondepression groups ($n \leq 40$)
Skill task:			
T1T2	-.12	-.19	-.02
ATE	.05	-.05	.27
TCE	-.07	-.26	.07
TCO	.02	[illegible]6	-.12
Chance task:			
T1T2	.11	.29	.0[illegible]
ATE	-.02	-.02	-.02
TCE	-.14	-.22	-.13
TCO	.07	.12	.04
DS	.32**	.62***	-.03
TS	-.25*	-.49***	.10
SRT	.27*	.36*	.04
CRT1	.30**	.37*	.24
CRT2	.35**	.38*	.37*
NCBR	-.11	-.11	-.11
NCBD	-.03	-.01	.09
VFCR	.20	.06	.33*
VFCD	-.06	.05	-.13
NCCR	-.12	-.19	-.04
NCCD	.09	.30	-.11
Self-Rating of Performance:			
Present	-.01	.04	.11
Aspired-to	-.29*	-.22	-.28

Note. Two-tailed tests.
*$p < .05$.
**$p < .01$.
***$p < .001$.

Table 39

Analyses of Covariance for the Psychomotor Speed Measures Using Age as a Covariate

Measure	Source	SS	df	MS	F
DS	Covariate	15,900.33	1	15,900.33	10.05**
	Group	25,358.46	3	8,452.82	5.34**
	Residual	118,692.50	75	1,582.57	
	Total	159,951.31	79	2,024.70	
TS	Covariate	30,987.98	1	30,987.98	6.35*
	Group	81,903.19	3	27,301.08	5.59**
	Residual	366,274.88	75	4,883.66	
	Total	479,166.06	79	6,065.39	
SRT	Covariate	36,755.05	1	36,755.05	6[illegible]
	Group	25,623.74	3	8,541.25	1[illegible]3
	Residual	449,594.19	75	5,994.59	
	Total	511,973.00	79		
CRT1	Covariate	595,756.63	1	595,756.63	8.16**
	Group	360,567.25	3	120,189.06	1.65
	Residual	5,475,114.00	75	73,001.50	
	Total	6,431,438.00	79	81,410.56	
CRT2	Covariate	9,443,498.00	1	9,443,498.00	11.28***
	Group	5,412,895.00	3	1,804,298.00	2.16^t
	Residual	62,791,072.00	75	837,214.00	
	Total	77,647,472.00	79		

^t Trend ($p < .10$).
*$p < .05$.
**$p < .01$.
***$p < .001$.

Intelligence. The Clark-WAIS IQ was correlated with selected variables (Table 40). There was no correlation between IQ and the expectancy change measures and the figure reversal variables. Moderately high correlations were found between IQ and psychomotor speed measures, and self-ratings of performance. The higher the IQ, the less psychomotor retardation a subject showed. The higher the IQ, the higher a subject rated his/her present and aspired-to performance. An analysis of covariance (Table 41) was carried out to see if the results of psychomotor speed measures were different when IQ was statistically controlled. Significant Group effects were obtained for DS, $F(3, 75) = 4.47$, $p < .01$; for TS, $F(3, 75) = 5.26$, $p < .01$; and for CRT2, $F(3, 75) = 2.69$, $p < .05$. There was no significant Group effect for SRT; while CRT1 yielded marginal significance, $F(3, 75) = 2.44$, $p < .10$. When compared with ANOVA results presented earlier (pp. 128 to 13[illegible], Table 20), the only change of results when IQ was controlled was the disappearance of the marginal significance for SRT. Thus, a lack of control for IQ did not seem to affect the difference in the psychomotor speed exhibited by the groups.

An analysis of covariance (Table 42) was also carried out to see if the results of self-ratings of performance were different when IQ was statistically controlled. Significant Group effect was obtained only for self-rating of present performance, $F(3, 75) = 4.70$, $p < .01$. Thus, it appears that the self-rating of aspired-to performance was somewhat affected by the inequality of IQ between groups.

Table 40

Correlation between IQ and Selected Variables

Variable	Depression & nondepression groups (n ≤ 80)	Depression groups (n ≤ 40)	Nondepression groups (n ≤ 40)
Skill task:			
T1T2	.13	.00	-.25
ATE	.10	.11	-.15
TCE	-.04	.10	-.08
TCO	-.22	-.28	-.23
Chance task:			
T1T2	.04	-.17	.14
ATE	.16	.24	-.01
TCE	-.08	-.06	.10
TCO	-.16	-.21	-.16
DS	-.30**	-.41**	-.15
TS	.36***	.27	.28*
SRT	-.34***	-.36*	-.11
CRT1	-.36***	-.37*	-.46**
CRT2	-.40***	-.37*	-.4[illegible]**
NCBR	.17	-.07	.30*
NCBD	-.26*	-.34*	.03
VFCR	-.03	-.03	.03
VFCD	.17	-.05	.33*
NCCR	-.06	-.09	-.01
NCCD	-.09	-.12	.03
Self-Rating of Performance:			
Present	.45***	.36*	.31*
Aspired-to	.46***	.48**	.33*

Note. Two-tailed tests.
*$p < .05$.
**$p < .01$.
***$p < .001$.

Table [illegible]

Analyses of Covariance for Psychomotor Speed Measures
Using Clarke-WAIS IQ as a Covariate

Measure	Source	SS	df	MS	F
DS	Covariate	14,604.62	1	14,604.62	8.88**
	Group	22,041.91	3	7,347.30	4.47**
	Residual	123,304.75	75	1,644.06	
	Total	159,951.31	79		
TS	Covariate	60,823.82	1	60,823.82	13.20***
	Group	72,675.50	3	24,225.16	5.[illegible]**
	Re[illegible]	345,666.75	75	4,608.89	
	To[illegible]	479,166.06	79		
SRT	Covariate	57,571.12	1	57,571.12	10.16**
	Group	29,363.60	3	9,787.86	1.73
	Residual	425,038.31	75	5,667.18	
	Total	511,973.00	79		
CRT1	Covariate	814,967.69	1	814,967.69	11.94***
	Group	498,427.38	3	166,142.44	2.44^{t}
	Residual	5,118,043.00	75	68,240.56	
	Total	6,431,438.00	79		
CRT2	Covariate	12,238,29[illegible]00	1	12,238,299.00	15.54***
	Group	6,359,223.00	3	2,119,741.00	2.69*
	Residual	59,049,952.00	75	787,332.69	
	Total	77,647,472.00	79	982,879.38	

^{t}Trend ($p < .10$).
*$p < .05$.
**$p < .01$.
***$p < .001$.

Table 42

Analyses of Covariance for Self-Ratings of Performance Using Clarke-WAIS IQ as a Covariate

Source	SS	df	MS	F
Self-Rating of Present Performance				
Covariate	9.80	1	9.80	21.95**
Group	6.29	3	2.10	4.70**
Residual	33.47	75	.45	
Total	49.55	79		
Self-Rating of Aspired-to Performance				
Covariate	14.01	1	14.01	20.76**
Group	2.87	3	.96	1.42
Residual	16.88	75	.68	
Total	67.49	79		

* $p < .01$.
** $p < .001$.

Discriminant Analyses

In order to obtain the maximum diagnostic differentiation among the ED, RD, NDP and NDN groups, a stepwise discriminant analysis was carried out. The four groups were originally defined on the basis of the Beck Depression Inventory, the Levine-Pilowsky questionnaire, and psychiatric diagnosis. The following measures were used as independent variables (V): (1) Age, (2) Rotter I-E, (3) Buss-Durkee Total Hostility, (4) Buss-Durkee Guilt, (5) EPQ Psychoticism, (6) EPQ Extraversion, (7) EPQ Neuroticism, (8) Skill Task Expectancy after final trial, (9) Chance Task Expectancy after final trial, (10) Digit Symbol, (11) Tapping Speed, (12) Simple Reaction Time, (13) Complex Reaction Time, Level 1, and (14) Complex Reaction Time, Level 2.

The following discriminant functions were obtained:

Function 1:

$$\underline{d}_1 = 1.07516 - .02345\underline{V}_1 + .02040\underline{V}_2 + .01633\underline{V}_4 - .08096\underline{V}_5 + .01895\underline{V}_6 - .13091\underline{V}_7 + .11132\underline{V}_8 - .120078\underline{V}_9 + .00235\underline{V}_{10} + .00315\underline{V}_{11} - .00020\underline{V}_{13}$$

Function 2:

$$\underline{d}_2 = 2.30908 - .02984\underline{V}_1 - .09496\underline{V}_2 - .37009\underline{V}_4 + .09207\underline{V}_5 + .03766\underline{V}_6 + .09389\underline{V}_7 - .03570\underline{V}_8 + .08399\underline{V}_9 + .01622\underline{V}_{10} - .00475\underline{V}_{11} - .00181\underline{V}_{13}$$

Function 3:

$$\underline{d}_3 = -2.70760 - .01191\underline{V}_1 + .07160\underline{V}_2 - .07964\underline{V}_4 + .17640\underline{V}_5 - .03947\underline{V}_6 + .02394\underline{V}_7 + .03930\underline{V}_8 - .04527\underline{V}_9 + .00365\underline{V}_{10} + .00626\underline{V}_{11} - .00134\underline{V}_{13}$$

This discriminant analysis classified correctly 60 out of 80 subjects.

The correct prediction ("hit rate") was 75%. The details of cross-classification are presented in Table 43.

In addition, a stepwise discriminant analysis was carried out using only two groups: Endogenous Depressives and Reactive Depressives, using the 14 variables as in the previous discriminant analysis with an added 15th variable: PDF (Patient Description Form). Four variables were found to be discriminating: EPQ-Extraversion (V_6), EPQ-Neuroticism (V_7), Tapping Speed (V_{11}) and the Patient Description Form (V_{15}). The following discriminant function was obtained:

$$\underline{d} = -.90147 + .05489V_6 + .07740V_7 - .00685V_{11} + .09386V_{15}.$$

This discriminant function correctly classified 27 depressed patients out of 40. The correct prediction ("hit rate") was 67.5%. The details of cross-classification are presented in Table 44.

Table 43

The Hit Rate of the Discriminant Analysis

Using 4 Groups and 14 Variables

Classification	Group	Discriminant analysis classification			
		ED	RD	NDP	NDN
A priori classification	ED	14	5	1	0
	RD	3	14	2	1
	NDP	0	3	15	2
	NDN	0	1	2	17

Note. ED = Endogenous depressed.
RD = Reactive depressed.
NDP = Nondepressed psychiatric.
NDN = Nondepressed normal.

Table 44

The Hit Rate of the Discriminant Analysis
Using 2 Depressed Groups and 15 Variables

Classification	Group	Discriminat analysis classification: ED	RD
A priori classification	ED	14	6
	RD	7	13

Note. ED = Endogenous depressed.
RD = Reactive depressed.

Factor Analyses

In order to define the basic dimensions on which the subjects differed, a principal factoring with iteration of 20 variables was carried out, using varimax rotation to simple structure to obtain orthogonal factors. The 20 variables included were: the five psychomotor speed variables, IQ, age, the three personality factors of EPQ, the Beck and Zung depression scales, the Buss-Durkee Hostility score, the Rotter Externality score, the skill task expectancy measures of ATE, T1T2, and TCE, and the chance task expectancy measures of ATE, T1T2, and TCE.[1] The factor matrix obtained is presented in Table 45. Five orthogonal factors were extracted, accounting for 66.4% of the variance. If a variable had a loading value of .3 or greater for a factor, it was considered loaded on that particular factor. The factors and the variables loaded on them are described as follows:

1. Factor 1: Tapping Speed, Simple Reaction Time, Complex Reaction Time--Level 1, Complex Reaction Time--Level 2, Digit Symbol, Clarke-WAIS IQ, and Age. This may be called a "Psychomotor Speed" factor. Previous correlational analyses had already shown the IQ and Age were correlated with the psychomotor speed measures, but ANCOVA already indicated that psychomotor speed results were only minimally influenced by these two variables. In fact, both Age and IQ had lower loading values than all the speed measures.

2. Factor 2: EPQ Extraversion, EPQ Neuroticism, Beck

[1]For correlational matrices, see Appendix I.

Table 45

Principal Factor Analysis with Iterations for 20 Variables:

Varimax Rotated Factor Matrix

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
TS	-0.62146	-0.24885	-0.05494	0.02690	0.09556
SRT	0.80536	-0.05394	-0.06103	-0.16400	0.02221
CRT1	0.92192	-0.02775	0.04417	-0.13962	0.04651
CRT2	0.90670	0.01753	-0.05021	-0.06501	-0.03933
DS	0.65794	0.07858	-0.02952	0.22850	0.07590
CWIQ	-0.44680	-0.30466	0.02119	-0.04834	-0.06719
Age	0.39826	0.03743	-0.01470	0.12978	-0.39275
EPQ-P	0.08960	0.18207	0.03624	-0.05980	0.89015
EPQ-E	0.05746	-0.50295	-0.07108	0.22130	0.05879
EPQ-N	0.07016	0.85811	0.11853	-0.09903	-0.00059
Beck	0.17346	0.85595	0.01189	-0.17649	0.06249
Zung	0.22287	0.81714	0.02690	-0.19785	0.09128
BD Hostility	0.01985	0.65849	0.22123	0.00786	0.41369
Rotter	0.04695	0.40096	0.09050	-0.45001	0.03253
Skill ATE	-0.08575	-0.21345	0.24958	0.69326	-0.07286
Skill TIT2	-0.19569	-0.05216	0.62124	0.01933	0.03051
Skill TCE	0.02896	0.13216	0.80911	-0.14703	0.12742
Chance ATE	0.04444	-0.19129	-0.17178	0.66344	-0.06314
Chance TIT2	-0.03624	0.08831	0.40172	0.07188	-0.19510
Chance TCE	0.24615	0.15421	0.50819	-0.02581	0.13874
Eigenvalue	4.99	3.45	2.00	1.44	1.41
% of variance (total)	24.90	17.30	10.00	7.20	7.00
Cumulative % (total)	24.90	42.20	52.20	59.40	66.40

Note. More than 25 iterations were required for convergence.

Depression, Zung Depression, Buss-Durkee Hostility, Rotter Externality, and Clarke-WAIS IQ. This may be called a "General Depression" factor. The cluster of variables loaded heavily on this factor involved high depression, neuroticism, hostility, and externality, but low extraversion (i.e., high introversion).

3. Factor 3: Skill Task T1T2 and TCE, and Chance Task T1T2 and TCE. This may be called an "Expectancy Change" factor.

4. Factor 4: Skill Task ATE, Chance Task ATE, and Rotter Externality. This may be another "Expectancy Change-Externality" factor. These two expectancy measures were the only two that showed some significant group difference, but they seemed to relate to low externality rather than high externality.

5. Factor 5: EPQ Psychoticism, Buss-Durkee Hostility, and Age. This may tentatively be called a "Psychoticism" factor, in Eysenck's sense. Aggressiveness and hostility have been the main contributors to P and apparently these were associated with younger age.

Rao's canonical factoring was then applied to the same 20 variables to find a factor solution in which the correlation between the set of hypothesized factors and the set of data variables is maximized. This method of factoring assumes that the given correlation matrix is based on a sample of cases, and asks what the most likely population parameters would be. It seeks a minimum number of factors to account for the observed correlation matrix, and provides a significance test for the number of factors. Table 46 presents

Table 46

Rao's Canonical Factor Analysis for 20 Variables: Varimax Rotated Factor Matrix

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
TS	0.58920	-0.19006	-0.07976	0.04009	0.09080
SRT	0.81160	-0.02704	-0.08569	-0.14172	-0.01341
CRT1	0.94955	-0.00419	0.01599	-0.12105	0.02206
CRT2	0.93441	0.02107	-0.07111	-0.03639	-0.04187
DS	0.61996	0.02546	-0.02740	0.18981	0.07812
CWIQ	-0.40832	-0.27831	-0.04309	-0.03074	-0.0591[illegible]
Age	0.35604	0.07646	-0.02617	0.10812	-0.40601
EPQ-P	0.11140	0.19055	0.02444	-0.04612	0.90779
EPQ-E	0.05284	-0.47087	-0.07975	0.14909	0.00966
EPQ-N	0.06869	0.76503	0.08617	-0.09136	-0.00199
Beck	0.16939	0.93777	-0.00566	-0.13122	0.04763
Zung	0.22641	0.90899	0.01531	-0.16902	0.06798
BD Hostility	-0.00147	0.57881	0.19656	-0.05403	0.42900
Rotter	0.08980	0.35483	0.10531	-0.39281	0.03833
Skill ATE	-0.06945	-0.21698	0.29312	0.82145	-0.05618
Skill T1T2	-0.15737	0.01134	0.60472	0.05755	0.04165
Skill TCE	0.03848	0.14381	0.91893	-0.15706	0.10159
Chance ATE	0.06017	-0.17750	-0.18725	0.66092	-0.08292
Chance T1T2	-0.02024	0.01555	0.25034	0.04488	-0.16184
Chance TCE	0.24315	0.17195	0.44011	-0.08176	0.13947
Chi square	1,175.96	740.90	511.76	334.12	177.30
df	170	151	133	116	100
Probability	< .001	< .001	< .001	< .001	< .001

Note. More than 25 iterations were required for convergence.

the varimax rotated factor matrix and significance test results. The factor loading pattern was almost identical to that obtained by the initial principal factoring. Five factors were extracted as the most parsimonious fit between the data and the hypothesized factors.

Further exploration was conducted by a principal factoring of the same 20 variables, but nonorthogonal factors were obtained by oblimin oblique rotations to simple structure. The terminal factor pattern matrix is shown in Table 47. Again, five factors were extracted. The major change was that the orthogonal Factor 1 (Psychomotor Speed) became the oblique Factor 2, and vice versa, the orthogonal Factor 2 (General Depression) became the oblique Factor 1. Similarly, the orthogonal Factor 4 (Expectancy Change-Externality) became the oblique Factor 5, and vice versa, the orthogonal Factor 5 (Psychoticism) became the oblique Factor 4. Factor 3 remained the same in both factor solutions. Individual variable loading pattern on various factors was also almost identical in both factor solutions.

In addition, principal factorings of 22 variables (the above 20 plus Patient Description Form endogenicity score and the Levine-Pilowsky ED vs. RD score), involving only the 60 patient subjects, and using varimax rotation and oblimin oblique rotation. The terminal rotated factor matrices are presented in Tables 48 and 49. Orthogonal Factor 1 was primarily psychomotor speed, age and IQ (comparable to the oblique Factor 2). Orthogonal Factor 2 involved extraversion, neuroticism, depression, externality, and two expectancy change

Table 47

Principal Factor Analysis with Iterations for 20 Variables: Oblique Rotation Factor Pattern Matrix

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
TS	-0.20735	-0.59712	-0.04733	0.10627	0.00038
SRT	-0.15208	0.83671	-0.03201	0.02044	-0.16839
CRT1	-0.14320	0.95520	0.07424	0.04328	-0.13821
CRT2	-0.06284	0.92016	-0.02897	-0.03999	-0.06003
DS	0.06826	0.63653	-0.03084	0.08[illegible]95	0.25588
CWIQ	-0.29302	-0.40311	0.04320	-0.06054	-0.09157
Age	0.05969	0.38137	-0.01225	-0.39131	0.12136
EPQ-P	0.10776	0.08319	0.01933	0.88980	0.00645
EPQ-E	-0.49530	0.11332	-0.02944	0.08862	0.17783
EPQ-N	0.87625	-0.04455	0.04097	-0.03793	-0.00716
Beck	0.85812	0.06219	-0.06242	0.02493	-0.08331
Zung	0.80477	0.12130	-0.04149	0.05431	-0.10793
BD Hostility	0.64700	-0.06253	0.15847	0.39029	0.10313
Rotter	0.32595	0.02977	0.06957	-0.00273	-0.42121
Skill ATE	-0.11264	-0.09991	0.24858	-0.04115	0.69132
Skill T1T2	-0.10755	-0.15771	0.63210	0.02058	0.01224
Skill TCE	0.01014	0.06806	0.81595	0.10144	-0.13369
Chance ATE	-0.05885	0.00833	-0.17843	-0.02463	0.66579
Chance T1T2	0.07916	-0.03694	0.39758	-0.20536	0.07247
Chance TCE	0.07104	0.25869	0.50817	0.12391	-0.00185

Note. Moderate oblique rotation, delta = 0, by direct oblimin method. More than 25 iterations were required for convergence.

Table 48

Principal Factor Analysis with Iterations for 22 Variables with Normal Subjects Excluded: Varimax Rotated Factor Matrix

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
TS	-0.64861	-0.22574	0.12137	-0.15434	0.26737
SRT	0.81230	0.02083	0.06102	-0.08523	-0.02400
CRT1	0.93317	0.02571	0.12160	-0.02179	0.02227
CRT1	0.88737	0.02335	0.09324	-0.08046	-0.10612
DS	0.63113	-0.13066	-0.13853	0.07581	-0.03279
CWIQ	-0.42108	-0.03602	-0.19663	0.05505	-0.09109
Age	0.35043	-0.11720	0.23197	-0.02795	-0.53836
EPQ-P	0.10567	0.10714	0.05953	0.05998	0.72602
EPQ-E	0.11772	-0.63220	0.01416	-0.31877	0.16966
EPQ-N	-0.07493	0.53957	0.36947	0.43896	-0.02017
Beck	0.03906	0.53599	0.70962	0.21023	0.00144
Zung	0.08892	0.52521	0.71173	0.18297	0.04569
PDF	0.08399	0.09750	0.20257	0.12451	-0.49510
LPD	-0.12484	-0.13582	-0.78234	-0.04741	0.29583
BD Hostility	-0.05886	0.32214	0.27907	0.44876	0.49198
Rotter	0.07059	0.67663	0.21843	0.05385	0.03994
Skill ATE	-0.10870	-0.60616	-0.18525	0.35630	-0.08563
Skill T1T2	-0.17132	0.00526	0.05588	0.64980	-0.00873
Skill TCE	0.09278	0.28098	0.09130	0.64072	0.17668
Chance ATE	-0.02753	-0.66221	-0.09374	-0.05158	-0.16323
Chance T1T2	-0.01676	-0.01656	-0.00583	0.49272	-0.17715
Chance TCE	0.31523	0.05612	0.16743	0.48382	0.17584
Eigenvalue	5.0[illegible]	3.97	2.11	2.05	1.26
% of variance (total)	23.10	18.00	9.60	9.30	5.70
Cumulative % (total)	23.10	41.20	50.80	60.10	65.80

Note. Convergence required ll iterations.

Table 49

Principal Factor Analysis with Iterations for 22 Variables with Normal Subjects Excluded: Oblique Rotation Factor Pattern Matrix

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
TS	0.18849	-0.67343	0.24992	-0.13464	0.28645
SRT	0.02628	0.80880	0.00951	-0.09404	-0.00395
CRT1	0.08169	0.92520	0.06602	-0.03440	0.01715
CRT2	0.05887	0.87891	-0.06837	-0.09040	-0.00366
DS	-0.17437	0.65653	-0.00563	0.09848	0.09992
CWIQ	-0.18930	-0.39829	-0.11602	0.07227	-0.03031
Age	0.25889	0.31085	-0.81331	-0.01963	0.14475
EPQ-P	0.03035	0.11357	0.73692	0.03535	-0.02445
EPQ-E	0.07931	0.10453	0.18601	-0.24541	0.66915
EPQ-N	0.33682	-0.10872	-0.00828	0.35793	-0.43675
Beck	0.71165	-0.04676	0.02745	0.10969	-0.33780
Zung	0.71256	0.00311	0.07365	0.08271	-0.32281
PDF	0.21280	0.05317	-0.48418	0.10914	-0.08022
LPD	-0.83809	-0.01632	0.25743	0.00470	-0.06967
BD Hostility	0.24608	-0.07310	0.51085	0.39377	-0.18858
Rotter	0.16722	0.04974	0.03421	-0.04263	-0.63702
Skill ATE	-0.15281	-0.08073	-0.06909	0.44796	0.58730
Skill TIT2	0.04092	-0.16144	0.00765	0.65442	0.03881
Skill TCE	0.03588	0.10567	0.19819	0.60561	-0.22126
Chance ATE	-0.03224	-0.02528	-0.15087	0.03827	0.64866
Chance TIT2	-0.02170	-0.00468	-0.16283	0.50285	0.02158
Chance TCE	0.13543	0.31303	0.21237	0.47096	0.03185

Note. Moderate oblique rotation, delta = 0, by direct oblimin method. Convergence required 11 iterations.

variables (roughly comparable to oblique Factor 5, except that it did not have loadings of depression variables). Orthogonal Factor 3 had highest loading on Beck, Zung, and Levine-Pilowsky ED vs. RD scores (comparable to oblique Factor 1). Orthogonal Factor 4 consisted of neuroticism, hostility, and almost all expectancy change variables (comparable to oblique Factor 4). Orthogonal Factor 5 involved psychoticism, hostility, PDF endogenicity, and age (comparable to oblique Factor 3). In sum, orthogonal Factor 1 may be called "Psychomotor Speed," Factor 2 "Psychopathology," Factor 3 "Depression," Factor 4 "Expectancy Change," and Factor 5 "Psychoticism." The oblique solution differed from the orthogonal solution basically only in the position of the factors. Compared with the factor matrix obtained from all 80 subjects, this 60-subject analysis was different primarily in the emergence of a more distinct "severity of depression" factor. This, of course, was not surprising because two-thirds of the sample were depressives. As for the two new variables included, the LPD ED vs. RD score belonged to the Beck-Zung depression severity cluster; whereas the PDF endogenicity measure was associated with psychoticism and hostility. The latter association may mean the dissociation of endogenous depression from neuroticism, but one should bear in mind that the factor solution obtained was from a rather small sample of subjects and extra caution should be exercised in making inferences from the results of the present study.

Finally, the relations of 14 variables to the Eysenck orthogonal

Personality dimensions of Psychoticism, Extraversion, and Neuroticism were explored. First, a principal factoring without iteration involving the three EPQ variables was carried out to obtain a matrix of three unrotated factors. Second, an identity target matrix was set up to represent the three orthogonal Eysenck personality factors. Third, an orthogonal procrustes rotation was applied to the unrotated EPQ factor matrix to conform as nearly as it would to the target matrix. A transformation matrix was produced in this rotation procedure. Fourth, a principal factoring without iteration involving 14 variables (the same 20 variables used above including the EPQ variables, but excluding the six expectancy measures) was conducted to obtain an unrotated three-factor matrix. Fifth, the transformation matrix obtained in Step 3 was applied to the unrotated three-factor matrix obtained in Step 4 to yield a rotated three-factor matrix for the 14 variables; as presented in Table 50. If there was orthogonality between the three Eysenck factors, the P, E, and N variables should load highly on Factors I, II, and III respectively. However, E and N both loaded highly on Factor I, althoug P did load independently on Factor III. As for the other variables, Beck, Zung, Hostility and Externality (the "psychopathology-depression" variables) all loaded together with E, and N on Factor I. The psychomotor speed variables, age, and IQ formed the second factor; while age and hostility loaded with P on Factor III. It is obvious that Extraversion and Neuroticism belonged to the "psychopathology" cluster and

Table 50

Orthogonal Procrustes Rotation Factor Matrix
Using a Target Matrix Based on
Eysenck's Three Orthogonal Personality Factors
Involving 14 Variables and 80 Subjects

Variable	I	II	III
TS	-0.26461	0.68635	-0.07588
SRT	-0.02668	-0.78993	0.31249
CRT1	0.02067	-0.83863	0.35382
CRT2	0.03183	-0.86673	0.26646
DS	0.00901	-0.65593	0.32463
CWIQ	-0.30675	0.46995	-0.21921
Age	-0.04050	-0.62798	-0.43054
Beck	0.88139	-0.17697	0.01458
Zung	0.85569	-0.21154	0.06184
BD Hostility	0.70488	0.13172	0.44240
Rotter	0.58585	-0.03343	0.00145
EPQ-P	0.27352	0.17908	0.83678
EPQ-E	-0.65540	-0.02222	0.22281
EPQ-N	0.88031	-0.07588	-0.01505

Note. Target matrix was: P: 0 0 1
E: 0 1 0
N: 1 0 0

were not orthogonal to each other. This absence of orthogonality will be taken up in the "Discussion" section.

CHAPTER IV

DISCUSSION

The primary focus of the discussion will be on the learned helplessness measures of skill and chance task expectancy changes to determine to what degree the learned helplessness theory of depression is supported. Secondarily, the implication of the psychomotor speed findings will be discussed. Finally, the results of the personality variables will be analysed.

Expectancy Changes in Skill and Chance Tasks

The main purpose of the present study has been to see if the findings of Miller and Seligman (1973) regarding the expectancy change of nonclinically depressed subjects on skill and chance tasks could be generalized to clinically depressed subjects. The results obtained in the present study clearly indicated that depressed patients did not behave in the same manner as depressed college students. Despite the use of identical tasks, experimental procedures, and dependent measures in both studies, the expectancy change data collected in the present study failed to support the findings of Miller and Seligman.

According to Miller and Seligman (1973), if depressed subjects are learned-helpless, they should see things as more response-independent than nondepressed subjects. In the laboratory situation, the <u>difference</u> in expectancy change between skill and chance tasks should be <u>less</u> for the depressed groups than for the nondepressed groups. The crucial interaction for testing the hypothesis is that of Depression Groups X Tasks. Miller and Seligman (1973) found this interaction significant for the dependent measures of After Task Expectancy (ATE) and Total Expectancy Change in the Expected Direction (TCE), but marginally significant for the measure of Trial 1 to Trial 2 Expectancy Change (T1T2). In the present study, only the ATE measure was marginally significant. Examination of the orthogonal comparison and multiple range test results revealed that the source of this marginal significance was the difference between the non-depressed psychiatric patients and the normals, and had nothing to do with the depression-versus-nondepression contrast. The present study used an additional dependent measure of Total Expectancy Change in the Opposite Direction (TCO), not used by Miller and Seligman (1973), but used by Rotter, Liverant, and Crowne (1961), and recommended by Costello (1978). This is a measure of inappropriate shifts. If depressives show more response-outcome independence than the non-depressed, they should exhibit more inappropriate shifts in expectancy. A positive finding relating to this measure actually gives more support to the hypothesis than the TCE measure of appropriate shifts, and the partial change measures of T1T2 and ATE. The present study did not find a significant Depression Groups X Tasks interaction for TCO.

According to Miller and Seligman (1973), another important method to demonstrate the differential expectancy of the depressed and non-depressed subjects was to examine the correlation between the Beck

Depression Inventory scores and expectancy change measures. If depressed subjects are learned-helpless, the more depressed they are, the less should be their expectancy change in skill task; while depression and chance task expectancy are uncorrelated. Miller and Seligman (1973) found this negative correlation significant in the measures T1T2 and ATE, but not in TCE. There was no significant correlation in the chance task. The present study found a significant negative correlation for ATE, but a significant positive correlation for TCE. Both T1T2 and TCO correlations were nonsignificant. (For TCO, the predicted correlation should be positive; because the more depressed a person is, the more inappropriate shifts he/she will exhibit.) However, similar significant correlations for ATE and TCE were also found in the chance task.

Therefore, the two basic indices of learned helplessness in depressed subjects used by Miller and Seligman (1973) (the Depression Groups X Tasks interaction, and the correlation between the Beck Depression Inventory scores and expectancy measures), were found in the present study to indicate an absence of learned helplessness, hypothesized by Miller and Seligman.

One major difference between the results of Miller and Seligman (1973) and the present study was the presence of group differences on initial expectancy found in the present study. An absence of group differences in the initial expectancy ratings is important because of Miller and Seligman's method of scoring and calculation of expectancy change measures. In fact, if the groups are not equivalent on this pretask expectancy ratings, they are not on the same baseline; although they are using the same 11-point rating scale, they may show different ceiling effects. In all previous studies, whether the subjects were college students (Klein & Seligman, 1976, Experiment 2; Miller et al., 1975; Miller & Seligman, 1976; McNitt & Thornton, 1978; Willis & Blaney, 1978, Experiments 1 & 2), or psychiatric patients (Abramson et al., 1978; O'Leary et al., 1978; Smolen, 1978), the between-group initial expectancies were always found not to differ. Thus, the significant difference found in the present study was somewhat surprising and created a problem in data analysis. The Nondepressed Psychiatric group was found to give higher initial ratings than the other groups, contributing to a significant Group effect. The same group together with the Reactive Depression group gave higher initial expectancies on the skill task than on the chance task, and vice versa for the other two groups, thus producing a Group X Task interaction. One probable reason for the significant difference is the inclusion of the NDP group in the present study, while such a patient control group was not found in earlier studies. The subjects of this group may likely be atypical, in the sense that they were patients with psychoneurotic or character disorders, yet they had to be within the nondepressed normal range (BDI ≤ 9) to be included as subjects. It is somewhat unlikely for a person being hospitalized for mental disorder to be without some degree of depression, and more particularly, to be just as nondepressed as a normal control subject. The fact that considerable difficulty was encountered in finding suitable subjects to fill the NDP group gives credibility to such a speculation.

Consequently, the expectancy ratings on both tasks had to be statistically adjusted for the lack of equality of the initial task ratings. The method used has its limitations too. The multiple regression employed is most effective if there is a homogeneity of individual group regression coefficients. This condition, however, is difficult to meet when there are significant differences between the group means.

Nevertheless, the set of expectancy data has been analysed by different procedures using both the statistically adjusted and the original unadjusted ratings, and has been found to give very similar results. Notably, when the Nondepressed Psychiatric group was excluded from the analyses using the unadjusted scores, the overall pattern of results remained unchanged. Thus, while the difference of between-group initial expectancy did require some statistical transformations, the data collected provide no ground at all to support the prediction of response-outcome independence in the depressives. The present study is, in conclusion, inconsistent with Miller and Seligman's (1973) study.

When compared with other patient studies using the skill-chance task paradigm, the findings of the present study are consistent with those of O'Leary et al. (1978) and Smolen (1978), and inconsistent with that of Abramson et al. (1978). As mentioned earlier, the O'Leary et al. and Smolen studies investigated the severity of depression rather than the psychiatric category of depression. The former study used alcoholics, and latter mixed psychiatric patients. Further, Smolen employed card-sorting and peg-sorting tasks with skill or chance instructions. These might not be comparable to Miller and Seligman's (1973) tasks. Therefore his negative results could not be considered as a failure to replicate the Miller and Seligman findings. The present study investigated depression as a psychitaric category with emphasis on the differentiation of a reactive depression group, because Seligman repeatedly pointed out learned helplessness as most applicable to the reactive depressives. Moreover, the tasks employed were identical to Miller and Seligman's (1973) study. The Abramson et al. (1978) study investigated depression as a nosological category and attempted to show that learned helplessness was specific to depression by the inclusion of schizophrenic groups. The BDI cut-off score for depression was 14 or more; this is lower than that of 18 or more in the present study. Further, the expectancy dependent measures of T1T2, ATE and TCO were not used. Only the TCE measure was included. According to their breakdown of the total change measure, only one half of it (decrease following failure) yielded significant results. Thus, at best, they could only claim partial support of the learned helplessness theory of depression (p. 105). The present study is similar to Abramson et al.'s (1978) study in investigating depression as a psychiatric category, and in using the same skill and chance tasks. Although it did not include other psychopathological groups for comparison, it focussed on reactive depression (which is of crucial interest to Seligman's learned helplessness theory of depression) rather than depression in general. It also employed dependent measures other than the TCE. The present study, therefore, provides an independent attempt to test Seligman's hypothesis. It is inconsistent with Abramson et al.'s study as far as the TCE measure is concerned. Since the other three dependent measures, especially the TCO measure, were not used by Abramson et al., it is impossible to speculate as to how the two studies would compare on these measures.

Psychomotor Retardation

Although not investigated by Miller and Seligman (1973), Seligman (1974, 1975) repeatedly stressed a parallel between learned helplessness and depression in the symptom of passivity, retardation, or what he sometimes called "lowered response initiation." As mentioned in the introductory chapter, psychomotor retardation in depression has been well documented; and owing to its frequent association with endogenous depression (Costello, 1970), the inclusion of psychomotor speed measures should provide a good chance to test indirectly Seligman's learned helplessness theory of reactive depression.

The results of the present study indicated that except for Tapping Speed (TS), and Complex Reaction Time, Level 2 (CRT2), the other three psychomotor speed measures showed at best marginal significance between the depressed and the nondepressed groups when the effects of age and/or IQ were controlled. The Endogenous Depression group was consistently slower than the Reactive Depression group in all measures although significantly so only on TS. Again, except for TS, the severity of depression did not correlate with the degree of retardation. Further, trend analyses did not show any progressive retardation in either the endogenous or reactive group. On the whole, the psychomotor data did not yield a strong depression-versus-nondepression and an endogenous-versus-reactive differentiation. This, together with the lack of significance found in expectancy data, made it difficult to test effectively the hypothesis that reactive depression is characterized primarily by the perception of response-outcome independence, and endogenous depression by psychomotor retardation; and the alternative hypothesis that learned helplessness is a general factor underlying both reactive and endogenous depression.

In conclusion, while endogenous depressives tended to consistently show more psychomotor retardation than the reactive, the reactive depressives did not show more response-outcome independence than the endogenous. The data do not provide an unambiguous support for the learned helplessness hypothesis of reactive depression.

Hostility

Although Miller and Seligman (1973) did not include "hostility" as a variable to be investigated, Seligman (1974, 1975) repeatedly pointed out the lack of aggression as a common symptom of both learned helplessness and depression. He reasoned that for an individual who learned to be helpless, it is useless to be hostile. In a sense, this may be seen as a generalized perception of response-outcome independence. A depressive does not express hostility because it makes no difference whether he/she is hostile or not.

The results of the present study showed that the depressed groups were more hostile than the nondepressed. The reactive depressives, though not significantly, scored in the more hostile direction than the endogenous depressives. Both findings were contrary to the predictions derived from Seligman's description of learned helplessness. In particular, reactive depressives, who should be the least hostile according to the learned helplessness theory, scored the highest in hostility. This casts doubt on Seligman's claim that learned helplessness is most applicable to reactive depression.

External Locus of Control

Miller and Seligman (1973) included "externality" as an independent variable and found that it was not related to expectancy change in chance and skill tasks. They hypothesized that externals tended to perceive reinforcement as response independent, but their data did not support their prediction. Of course, the externality effect they hypothesized was quite similar to that of learned helplessness, as noted by Seligman et al. (1968) and Hiroto (1974) in their animal and human studies of learned helplessness respectively. Miller and Seligman's (1973) explanation of their negative finding was that Rotter I-E might be an invalid measure of externality; and they consequently questioned the construct validity of the I-E scale.

The present study did not include externality as an independent variable. Its I-E results showed that the depressed was more external than the nondepressed, as shown by orthogonal comparison and correlational analysis. Reactive depressives, who are supposed to have been more subject to helplessness learning, did not show higher externality than the endogenous depressives. Moreover, high externality did not associate with low expectancy changes, especially in the skill task. The higher externality found in the depressed groups than the nondepressed groups might be regarded as a weak support for the learned helplessness hypothesis. But the lack of difference between the reactive and the endogenous groups and the lack of correlation between externality and expectancy change consistent with the prediction of the response-outcome independence cast great doubt on whatever weak support was found. Of course, one can also interpret the lack of correlation between the externality scores and the expectancy change measures in the light of the questionable validity of the I-E scale as suggested by Miller and Seligman (1973). In addition, the finding of Lamont (1972) that the external items of the I-E were perceived as more dysphoric than the internal items might account for the higher externality scores of the depressives. Furthermore, the higher Guilt scores on the BDHI and the lower self-ratings of their present and aspired-to performance found in the depressed groups are perhaps suggestive of low self-esteem and hence an internal rather than an external locus of control.

The Reactive-Endogenous Distinction of Depression

The present study was not designed to examine the reactive-endogenous nosological distinction of depression, but the personality and depression data collected to investigate the relationship between reactive depression and learned helplessness permit some inferences to be drawn.

First, while both depressed groups were significantly more depressed than the nondepressed, the Endogenous Depression group consistently scored moderately higher than the Reactive Depression group on the severity of depression in both the subject classification instrument, the BDI, and all the ancillary depression measurements, the HDRS, LPD, ZSDS, MMPI-D, and DACL, although significantly so only on the HDRS and the LPD depression scores. This suggests the possibility that depression is a spectrum disease, with endogenous depression being a more severe form and reactive depression a milder one of basically the same nosological entity.

Second, on the psychomotor speed measures, the ED group again consistently tended to show more retardation than the RD group, although significantly so only on the TS measure. At the same time, both depression groups tended to show lower psychomotor speed than the nondepressed groups, particularly the normal controls, on all five measures, although significantly so just on the TS and CRT2. This also suggests a difference in severity rather than qualitatively different independent disorders.

Third, on the CAQ D scales, the depression-versus-nondepression contrast was significant, but there was a lack of distinction between the ED and RD. Similarly, the MMPI D-O, D-S, and Dr scales, which were hypothesized to differentiate the ED and RD subjects, failed to yield significant differences. Such a lack of differentiation between ED and RD casts some doubt on the nosological distinction or on the validity of the scales.

Fourth, on the EPQ, high Neuroticism and low Extraversion scores were obtained by both depression groups. The ED and RD subjects did not differ on all of P, E, and N. In particular, the RD group did not score higher on Neuroticism and lower on Psychoticism than the ED group. This lack of differentiation also casts some doubt on the ED-RD distinction.

However, the PDF, which was designed to show the qualitiative difference between the ED and the RD subjects, offers some support for the nosological distinction. The ED and RD subjects significantly differed from each other on the PDF score, while the RD did not differ from the Nondepressed Psychiatric patients. Further, the BDI measure of severity correlated significantly with the PDF scores if both depressed and nondepressed patient groups were included, but the correlation became nonsignificant if only the depressed groups were considered. This may suggest a lack of difference in severity between the ED and RD as far as the PDF is concerned.

The stepwise discriminant analysis indicated that the EPQ-E, EPQ-N, PDF, and TS discriminated between the ED and RD groups. But the "hit rate" was fairly low (67%), classifying correctly only 27 depressives out of 40.

The overall pattern of results does not allow a choice among the alternative quantitative, qualitative, or two-factor hypotheses of depression. However, the most plausible seems to be that of a general factor of depression severity with qualitatively different depression groups.

Eysenck's Orthogonal Personality Dimensions

Factor analyses indicated the emergence of four main clusters of variables in the present study: (a) "Psychomotor Speed," (b) "General Depression," (c) "Expectancy Change," and (d) "Psychoticism." These clusters remained quite consistent whether principal factoring or Rao's canonical factoring was conducted, whether orthogonal or oblique rotation was carried out, and whether all four groups or just the patient groups were used. Factors (a) and (b) accounted for more variance than factors (c) and (d). The separation of psychomotor speed, psychoticism, and depression as separate factors suggests a relative independence of psychomotor retardation from the severity of depression, and to a lesser extent, the existence of the Psychoticism dimension relatively independent of the general depression factor. The P dimension has been associated, in particular, with hostility, a main contributor to P. This finding is in agreement with Eysenck's description of the Psychoticism dimension of personality. According to him, an individual high on P is antisocial and hostile. Such an individual is not psychotic in the clinical sense, but is more vulnerable in a situation of stress to schizophrenic or paranoid psychotic breakdowns (Eysenck & Eysenck, 1975).

The confirmatory factor analysis involving a target matrix to represent Eysenck's orthogonal dimensions showed that only P was orthogonal, while E and N ceased to show orthogonality. The depressed groups scored high on N, and low on E, falling into the "dysthymia" quadrant of Eysenck (1961). This disappearance of orthogonality has very occasionally been mentioned by Eysenck, but never emphasized. Discussing the deductions from his postulated relation between the level of stimulation and hedonic tones in extraverts and introverts, Eysenck (1963) pointed out:

> Neuroticism and extraversion-introversion were considered quite separate and independent (orthogonal). It was however discovered that while this independence was indeed found to hold in normal populations, it ceased to apply in neurotic populations, or even in normal subgroups having high scores on neuroticism. (p. 12)

Such an interaction between E and N at high levels of N was also found in Eysenck and Claridge's (1962) investigation of the position of hysterics and dysthymics in a two-dimensional space of personality traits. In the EPQ Manual (Eysenck & Eysenck, 1975), the correlation between E and N in abnormal samples was acknowledged, although significance testing was not provided. For example, in male endogenous depressives, r was -.37, and in female endogenous depressives, r was -.13. In other samples, r ranged from .00 in female prisoners to -.51 in female psychotics. In the present study, the confirmatory factor analysis clearly showed that E and N belonged to the same factor because of their correlation, while P remained orthogonal. Once again, the "Psychomotor Speed" factor emerged as Factor II, independent of Factor I "General Depression" and Factor III "Psychoticism."

Conclusions

The following conclusions can be drawn from the present study:

1. Contrary to the findings of Miller and Seligman (1973) involving nonclinically depressed college students, the present study did not find, among clinically depressed psychiatric inpatients, any of the effects predicted by the learned helplessness model. In particular, none of the learned helplessness skill-versus-chance expectancy change differences emerged in the reactive depression group. The absence of response-outcome independence in this group casts doubt on Seligman's claim that the learned helplessness model is in particular applicable to reactive depression.

2. The symptoms, notably the lack of hostility and lowered response initiation, that were claimed by Seligman to be common to both learned helplessness and depression were found in the present study not to be characteristic of reactive depression. Thus, the applicability of learned helplessness as a model of reactive depression can be questioned.

3. The results in the present study suggest that while there is a tendency for endogenous depressives to differ quantitatively from reactive depressives, the two groups also have qualitative differences. Although no clear conclusion can be made regarding the nosological distinction of endogenous and reactive depressions, it is most plausible that while there is a general severity factor of depression, there are also relatively distinct depression groups like endogenous and reactive depressions.

4. The Eysenck personality dimensions of Extraversion and Neuroticism are not orthogonal in depressed patients. In the present study, such patients scored high on Neuroticism and low on Extraversion. When Neuroticism is high, it interacts with Extraversion and ceases to be orthogonal to E. This finding is consistent with Eysenck's findings. Psychoticism remains orthogonal, although Extraversion and Neuroticism are correlated.

Although the present study casts considerable doubt on Seligman's learned helplessness model of reactive depression, its conclusions are limited. Further investigation is required to confirm the findings of the present study. In particular, the following aspects should be considered:

1. The inclusion of some attributional variables is needed. Learned helplessness is a cognitive theory implying a perception of response-outcome independence. It is conceivable that the processes involved in this phenomenon are much more complicated than those in animal subjects. Seligman (Abramson, Seligman, & Teasdale, 1978) has recently reformulated his learned helplessness hypothesis by including some concepts of the attribution theory. The present study, for instance, has not dealt with the stability aspect of the perceived cause-effect relationship. Although the consistency of the task effect found may serve as some indirect evidence of perceived stability perception, a more direct control of the stability factor and other important causal attribution elements is desirable.

2. A more direct attempt is required to probe and isolate the cognitive deficit postulated by learned helplessness (Costello, 1978). More direct measures of the response-outcome independence perceived by the subject and of contingencies operating in the experimental situations should be devised to make sure that the hypothesized deficit has indeed been elicited. The present study, similar to that of Miller and Seligman, is inadequate in this aspect.

3. Studies should be carried out on other psychopathological groups to test whether learned helplessness is specific to depression. Abramson, Garber and others (1978) did include schizophrenics in their study. But an independent confirmation of their findings is necessary. It is also desirable to include in a future study a nonclinically depressed group of college students, because many previous studies, including the paradigmatic Miller and Seligman (1973) study, used subjects from this population.

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Appendix A

Levine-Pilowsky Depression Questionnaire

The LPD is a 57-item forced-choice questionnaire designed to classify psychiatric patients into 3 classes; Class A or 1 (Reactive depression), Class B or 2 (Endogenous depression), and Class C or 3 (Nondepression).

ADMINISTRATION

The subject is asked to answer the questions as quickly as possible by putting a circle round the "YES" or the "NO" following each question.

SCORING

For each subject, a "decision tree" classification method is applied. The 1 versus 2 comparison is applied first to decide whether a subject is a reactive or endogenous depressive. If the subject belongs to Class 1, then the 1 versus 3 comparison is performed to see if the subject is not a nondepressive (i.e., not in Class 3). If the subject belongs to Class 2, then the 2 versus 3 comparison is performed to see if the subject is not a nondepressive (i.e., not in Class 3). The 3-digit system (discriminant functions) was used for scoring. However, the 2-digit system (simplified weightings) was also used to see how the two systems are comparable. A score for depth of depression was also calculated for comparison with the Beck Depression Inventory score.

L.P.D. QUESTIONNAIRE

NAME (in full) .... DATE ....
(MR., MRS., MISS)

....

AGE .... RELIGION .... OCCUPATION ....

MARRIED. SINGLE. WIDOWED. DIVORCED OR SEPARATED. ....
(Please tick where appropriate.)

How long have you been ill? ....

INSTRUCTIONS: Please answer these questions as quickly as possible. Put a circle round your answer.

1. Are you more irritable towards other people? .. .. Yes No
2. Have you lost interest in watching television? .. .. .. Yes No
3. Do you have difficulty in falling asleep without tablets? .. .. Yes No
4. Do you feel depressed all day long? .. .. Yes No
5. Do you feel slowed up in your thinking? .. .. Yes No
6. Have you any serious money worries? .. .. Yes No
7. Have you had any recent family worries? .. .. Yes No
8. Have you lost someone you love in the past year? .. .. Yes No
9. Do you feel you are a bad person? .. .. Yes No
10. Have you moved house in the past year? .. .. Yes No
11. Do you avoid company? .. .. Yes No
12. Is it more difficult to concentrate on your work? .. .. Yes No
13. Have you any housing worries? .. .. Yes No
14. Do you wish you were able to cry? .. .. Yes No
15. Do you have a restless and disturbed sleep without tablets? .. .. Yes No
16. Do you feel most depressed in the evenings? .. .. Yes No
17. Are there times when you do not feel depressed? .. .. .. Yes No
18. Do you have less interest in reading newspapers? .. .. Yes No
19. Do you think you will get better? .. .. Yes No
20. Do you feel that people are sometimes talking about you? .. .. Yes No
21. Is it easy to fall asleep without tablets? .. .. Yes No
22. Is your appetite normal? .. .. Yes No
23. Have you less interest in sex? .. .. Yes No
24. Do you feel you are a burden to others? .. .. Yes No
25. Is life worth living? .. .. Yes No
26. Do you cry a lot? .. .. Yes No
27. Are you unable to cry? .. .. Yes No
28. Have you become constipated? .. .. Yes No
29. Do you feel happier in the mornings? .. .. Yes No
30. Do you suffer from a dry mouth? .. .. Yes No

31.	Have you less feeling for those close to you?	Yes	No
32.	Do you feel you are letting other people down?	Yes	No
33.	Have you lost your appetite?	Yes	No
34.	Have you had trouble at work in the past year?	Yes	No
35.	Do you wish you were dead?	Yes	No
36.	Do you waken much earlier than your usual time without tablets?	Yes	No
37.	Are you as good a person as most of your friends?	Yes	No
38.	Do you feel less depressed when you are with company?	Yes	No
39.	Do you think your illness is a punishment that you deserve?	Yes	No
40.	Do you have less interest in things you usually enjoy?	Yes	No
41.	Can you sleep normally without tablets?	Yes	No
42.	Do you waken at your usual time without tablets?	Yes	No
43.	Do you think there is something seriously wrong with your body?	Yes	No
44.	Is your depression the same all day long?	Yes	No
45.	Do you find difficulty in relaxing?	Yes	No
46.	Do you feel life is not worth living?	Yes	No
47.	Have you lost weight?	Yes	No
48.	Do you feel most depressed in the mornings?	Yes	No
49.	Have you overheard people talking about you?	Yes	No
50.	Do you feel this illness has been brought upon you by yourself?	Yes	No
51.	Do you feel slowed up in doing things?	Yes	No
52.	Does the future look hopeful?	Yes	No
53.	Do you feel happier in the evenings?	Yes	No
54.	Have you thought recently about ending your life?	Yes	No
55.	Do you feel time passing more slowly?	Yes	No
56.	Are you doing your work as well as you used to?	Yes	No
57.	Can you be easily cheered up?	Yes	No

THE UNIVERSITY OF ADELAIDE

DEPARTMENT OF PSYCHIATRY

LPD QUESTIONNAIRE

SCORING SHEET FOR DEPRESSION SCORE

QUESTIONNAIRE ITEM NUMBER	RESPONSE SCORED AS DEPRESSED
1	Yes
2	Yes
4	Yes
5	Yes
10	Yes
12	Yes
17	No
18	Yes
22	No
24	Yes
30	Yes
35	Yes
40	Yes
44	Yes
46	Yes
51	Yes
55	Yes
56	No
57	No

Each of the above responses is scored '1', so that the possible range of scores is from 0 - 19 ... a 20 point range. This may be expressed as 1 to 20 if preferred, adding a constant of 1 to the total.

Re. Scoring Sheets for LPD Questionnaire

Scoring sheets are presented at two levels of accuracy. The original scoring sheets, using three digits may be preferred when discriminating between two or more subjects whose scores are tied, or when decisions are borderline. The simplified single digit system has been found to produce highly comparable results. A check on the comparability of the two systems in the decisions concerning a number of borderline subjects yielded the following results:

Classes Compared	Scores on Three Digit System	Scores on One Digit System	Classifications 3 digit	1 digit
1 versus 2	+5.24 - 6.39	+11 - 13	2	2
	+8.46 - 7.17	+17 - 15	1	1
	+7.55 - 6.69	+16 - 14	1	1
	+6.04 - 5.26	+13 - 10	1	1
	+5.99 - 6.21	+13 - 14	2	2
	+5.79 - 4.62	+13 - 9	1	1
	+4.40 - 5.25	+10 - 11	2	2
	+5.33 - 5.67	+12 - 11	2	1 *
	+5.95 - 4.60	+12 - 9	1	1
	+5.10 - 4.45	+11 - 9	1	1
1 versus 3	+6.92 - 7.25	+15 - 14	3	1 *
	+6.35 - 8.76	+13 - 18	3	3
	+6.07 - 8.68	+13 - 17	3	3
	+7.69 - 8.58	+15 - 17	3	3
	+7.72 - 9.16	+16 - 18	3	3
	+7.67 - 5.60	+16 - 13	1	1
	+6.45 - 9.07	+14 - 21	3	3
2 versus 3	+9.51 - 9.79	+19 - 19 tie	3	no class
	+9.54 - 8.77	+18 - 18 tie	2	no class
	+11.08 -10.89	+22 - 22 tie	2	no class
	+9.77 - 8.04	+19 - 16	2	2
	+9.13 - 9.89	+18 - 20	3	3
	+10.51 -11.18	+21 - 22	3	3
	+9.17 - 8.12	+18 - 16	2	2
	+13.35 -14.10	+26 - 28	3	3
	+10.03 -10.61	+20 - 21	3	3

(*Difference in Classification)

Thus the single digit system would seem to provide a reasonable alternative for the three digit system except in extremely fine judgements.

METHOD FOR ESTIMATING PROBABILITY OF MEMBERSHIP IN A GROUP

Class 1 versus 2   1= +   2= -

DIRECTIONS FOR SCORING

For each questionnaire item circle the weighting for the subject's response in the appropriate column.

ITEM NUMBER	SUBJECT'S RESPONSE : WEIGHTINGS Yes	No
2	- 1	+ 2
6	+ 4	- 1
13	+ 2	- 1
45	0	+ 3
47	- 2	+ 2
51	0	+ 3

Weightings below apply to the total number of appropriate responses. e.g., if a subject circled "Yes" for item 20 and "Yes" for item 49, the number of appropriate responses would be 2, therefore the weighting would be +1.

Or if a subject circled "No" for item 20 and "Yes" for item 49, the number of appropriate responses would be 1, therefore the weighting would be 0.

ITEM NUMBER AND RESPONSE	WEIGHTINGS — Total number of appropriate responses 0	1	2	3	4
3 No + 21 Yes	-3	+2	+4		
15 No + 41 Yes	-4	+2	+7		
20 Yes + 49 Yes	-2	0	+1		
22 Yes + 33 No	-1	+1	+1		
36 No + 42 Yes	-4	+1	+6		
14 Yes + 26 No + 27 Yes	+1	0	+1	-2	
16 Yes + 29 Yes + 48 No + 53 No	0	-2	-1	+1	+1

Age	15-25	26-35	36-45	46-55	56-65	66+
Weighting:	+2	0	-1	+2	-5	-3

TOTAL OF ALL CIRCLED WEIGHTINGS:

(If the total is positive the classification is group 1, if it is negative the classification is group 2.)

METHOD FOR ESTIMATING PROBABILITY OF MEMBERSHIP IN A GROUP

Class 1 versus 3   1= +   3= -

DIRECTIONS FOR SCORING

For each questionnaire item circle the weighting for the subject's response in the appropriate column.

ITEM NUMBER	SUBJECT'S RESPONSE: Yes	WEIGHTINGS No
4	+ 2	- 1
5	+ 1	- 2
9	+ 3	- 1
18	+ 2	- 2
19	- 1	+ 3
24	+ 3	- 3
31	+ 2	- 1
35	+ 6	- 1
37	- 1	+ 3
40	+ 2	- 3
43	+ 2	- 1
44	+ 2	- 1
52	- 2	+ 3
54	+ 3	- 2
55	+ 2	- 1
57	- 2	+ 2

Weightings below apply to the total number of appropriate responses. e.g., if a subject circled "Yes" for item 25 and "No" for item 46, the number of appropriate responses would be 2, therefore the weighting would be -1.

Or if a subject circled "No" for item 25 and "Yes" for item 46, the number of appropriate responses would be 0, therefore the weighting would be +6.

ITEM NUMBER AND RESPONSE	WEIGHTINGS Total number of appropriate responses 0	1	2	3	4
20 Yes + 49 Yes	- 3	+ 1	+ 2		
25 Yes + 46 No	+ 6	0	- 1		
16 Yes + 29 Yes + 48 No + 53 No	0	- 2	- 1	+ 3	+ 1

Age	15-25	26-35	36-45	46-55	56-65	66+
Weighting	+1	+1	-1	+1	-3	-1

TOTAL OF ALL CIRCLED WEIGHTINGS:

(If the total is positive the classification is group 1, if it is negative the classification is group 3.)

METHOD FOR ESTIMATING PROBABILITY OF MEMBERSHIP IN A GROUP

Class 2 versus 3 2= + 3= -

DIRECTIONS FOR SCORING

For each questionnaire item circle the weighting for the subject's response in the appropriate column.

ITEM NUMBER	SUBJECT'S RESPONSE : WEIGHTINGS Yes	No
2	+ 3	- 2
4	+ 3	- 2
5	+ 1	- 3
12	+ 1	- 4
24	+ 3	- 4
35	+ 6	- 1
40	+ 2	- 4
44	+ 3	- 2
45	+ 1	- 4
51	+ 1	- 4
52	- 2	+ 2
55	+ 3	- 3
56	- 3	+ 1
57	- 2	+ 2

Weightings below apply to the total number of appropriate responses. e.g., if a subject circled "No" for item 3 and "Yes" for item 21, the number of appropriate responses would be 2, therefore the weighting would be - 4.

Or if a subject circled "No" for item 3 and 'No" for item 21, the number of appropriate responses would be 1, therefore the weighting would be - 1.

ITEM NUMBER AND RESPONSE	WEIGHTINGS TOTAL NUMBER OF APPROPRIATE RESPONSES 0	1	2	3
3 No + 21 Yes	+2	-1	-4	
15 No + 41 Yes	+2	-1	-7	
22 Yes + 33 No	+3	+1	-2	
25 Yes + 46 No	+6	0	-1	
36 No + 42 Yes	+3	0	-7	
14 Yes + 26 No + 27 Yes	+1	-1	-1	+3

DISCRIMINANT FUNCTIONS

Class 1 versus 2   1 = + ; 2 = -

Item Number	Yes	No
2	+0.70	+0.88
6	+1.87	-0.40
13	+0.89	-0.35
45	-0.12	+1.36
47	-0.76	+0.76
51	-0.19	+1.36

Items					
3 No + 21 Yes	0: -1.50	1: +0.95	2: +2.12		
15 No + 41 Yes	0: -1.81	1: +0.86	2: +3.47		
20 Yes + 49 Yes	0: -0.95	1: +0.21	2: +0.49		
22 Yes + 33 No	0: -0.68	1: +0.41	2: +0.63		
36 No + 42 Yes	0: -1.95	1: +0.51	2: +3.02		
14 Yes + 26 No + 27 Yes	0: +0.25	1: -0.06	2: +0.65	3: -0.93	
16 Yes + 29 Yes + 48 No + 53 No	0: -0.12	1: -1.06	2: -0.40	3: +0.65	4: +0.65

Age	15-25	26-35	36-45	46-55	56-65	66+
	+0.81	+0.01	-0.30	+0.93	-2.25	-1.37

SCORE:

DISCRIMINANT FUNCTIONS

Class 1 versus 3   1 = + ; 3 = -

Item Number	Yes	No
4	+1.09	-0.66
5	+0.50	-0.93
9	+1.41	-0.36
18	+0.82	-0.93
19	-0.56	+1.28
24	+1.32	-1.39
31	+1.16	-0.54
35	+3.02	-0.44
37	-0.57	+1.60
40	+0.92	-1.51
43	+1.21	-0.37
44	+1.15	-0.33
52	-1.18	+1.30
54	+1.39	-0.78
55	+1.01	-0.69
57	-0.80	+1.01

Items	0	1	2	3	4
20 Yes + 49 Yes	-1.45	+0.62	+1.14		
25 Yes + 46 No	+2.78	+0.01	-0.43		
16 Yes + 29 Yes + 48 No + 53 No	-0.23	-0.99	-0.54	+1.27	+0.50

Age	15-25	26-35	36-45	46-55	56-65	66+
	+0.32	+0.30	-0.63	+0.25	-1.25	-0.44

SCORE:

DISCRIMINANT FUNCTIONS

Classes 2 versus 3 2 = + ; 3 = -

Item Number	Yes	No
2	+1.47	-1.15
4	+1.27	-0.98
5	+0.67	-1.43
12	+0.62	-1.89
24	+1.42	-1.94
35	+3.10	-0.49
40	+1.00	-2.17
44	+1.71	-0.90
45	+0.35	-2.14
51	+0.49	-2.00
52	-0.97	+1.22
55	+1.27	-1.32
56	-1.52	+0.61
57	-1.21	+1.17

Items	0	1	2	3
3 No + 21 Yes	+1.04	-0.65	-2.02	
15 No + 41 Yes	+1.16	-0.30	-3.44	
22 Yes + 33 No	+1.40	+0.58	-1.04	
25 Yes + 46 No	+2.99	+0.05	-0.59	
36 No + 42 Yes	+1.55	+0.14	-3.45	
14 Yes + 26 No + 27 Yes	+0.35	-0.37	-0.52	+1.68

SCORE:

THE UNIVERSITY OF ADELAIDE

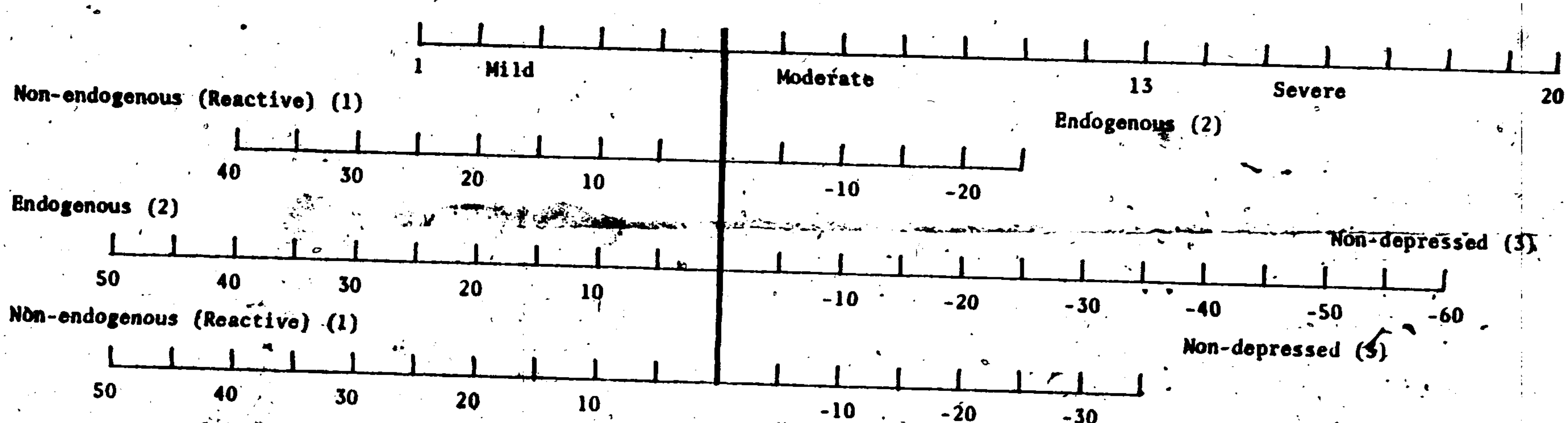
DEPARTMENT OF PSYCHIATRY

L.P.D. QUESTIONNAIRE REPORT FORM

NAME ______________________

AGE ________ DATE ______________

DEPRESSION SCORE		
1 v. 2		
2 v. 3		
1 v. 3		



Appendix B

Clarke-WAIS Vocabulary Test

The Clarke-WAIS Vocabulary Test (CWVT) is an unpublished scale developed by D. Paitich and G. Crawford of the Clarke Institute of Psychiatry, Toronto, Ontario.
It converts the 40-word individually administered Wechsler Adult Intelligence Scale (WAIS) Vocabulary subtest to a multiple-choice version. Four response alternatives were selected, including the correct one for each vocabulary item. While it provides the convenience of self-administration and objective scoring, it correlates highly (r = .92) with the original WAIS test and by means of regression analysis, it permits the extensive WAIS norms to be used in the interpretation of the results.

C A P E R

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CLARKE-WAIS VOCABULARY

INSTRUCTIONS

Here is a list of words. The first word on each line is in capital letters. Look at the word in capital letters then choose one of the words on the same line marked A, B, C, D which means the same or most nearly the same as the word in capital letters. Choose only one word on each line. If you don't know please guess.

DO NOT MARK IN THIS BOOKLET. USE
ANSWER SHEET PROVIDED.

Example:

1. SKY	A.	heaven	B.	up	C.	blue	D.	close
2. DOG	A.	animal	B.	horse	C.	swim	D.	tail

1. A B C D 2. A B C D

CLARK-WAIS VOCABULARY

1. BED:	A. cot	B. rest	C. seed	D. bury
2. SHIP:	A. travel	B. boat	C. carry	D. object
3. PENNY:	A. coin	B. girl	C. lane	D. round
4. WINTER:	A. climate	B. warm	C. season	D. continent
5. REPAIR:	A. replace	B. fix	C. match	D. work
6. BREAKFAST:	A. morning	B. table	C. hurry	D. meal
7. FABRIC:	A. cloth	B. elastic	C. brick	D. cover
8. SLICE:	A. cut	B. golf	C. bread	D. separate
9. ASSEMBLE:	A. factory	B. gather	C. pieces	D. people
10. CONCEAL:	A. animal	B. close	C. stamp	D. hide
11. ENORMOUS:	A. big	B. many	C. huge	D. terrific
12. HASTEN:	A. slow	B. hurry	C. tidy	D. late
13. SENTENCE:	A. statement	B. time	C. phrase	D. line
14. REGULATE:	A. command	B. timing	C. coffee	D. control
15. COMMENCE:	A. begin	B. speech	C. terminate	D. concur
16. PONDER:	A. fret	B. think	C. bear	D. pause
17. CAVERN:	A. house	B. ravine	C. cave	D. mouth
18. DESIGNATE:	A. ascertain	B. elect	C. assign	D. dessert
19. DOMESTIC:	A. animal	B. cultivated	C. couple	D. tame
20. CONSUME:	A. buy	B. use up	C. take	D. destroy
21. TERMINATE:	A. end	B. decide	C. discard	D. limit
22. OBSTRUCT:	A. impair	B. geometry	C. hinder	D. teach
23. REMORSE:	A. code	B. sin	C. repentance	D. anger
24. SANCTUARY:	A. haven	B. guilt	C. study	D. church
25. MATCHLESS:	A. single	B. incomparable	C. different	D. better
26. RELUCTANT:	A. hesitant	B. careless	C. unsure	D. shy
27. CALAMITY:	A. chaos	B. disaster	C. death	D. surprise
28. TRANQUIL:	A. flower	B. lucid	C. serene	D. drug
29. FORTITUDE:	A. zeal	B. integrity	C. prepared	D. stamina
30. EDIFICE:	A. facade	B. bridge	C. statue	D. building
31. COMPASSION	A. weak	B. pity	C. love	D. dramatic
32. TANGIBLE:	A. palpable	B. possible	C. asset	D. intermingle
33. PERIMETER:	A. boundary	B. distance	C. geometry	D. ancient
34. AUDACIOUS:	A. loud	B. poised	C. unbelievable	D. daring
35. OMINOUS:	A. weird	B. serious	C. awesome	D. foreboding
36. TIRADE:	A. tantrum	B. harangue	C. uncontrolled	D. bomb
37. ENCUMBER:	A. hold	B. burden	C. awkward	D. vegetable
38. PLAGIARIZE	A. copy	B. lie	C. plague	D. annoy
39. IMPALE:	A. hurt	B. torture	C. transfix	D. whiten
40. TRAVESTY:	A. injustice	B. journey	C. mockery	D. immoral

INSTRUCTIONS FOR SCORING THE CLARKE-WAIS VOCABULARY TEST (BASED ON THE WAIS VOCABULARY)

1. Calculate the number of words right on Clarke-WAIS Vocabulary. Multiply by 2. This is the Clarke-WAIS Score.

2. Subtract 7 from the Clarke-WAIS Score. This is the Predicted Raw Score. The exact equation is: predicted raw score = 1.0148 (Clarke-WAIS Score) - 6.696.

3. Locate tables in WAIS manual (1955), pages 101-110. Establish subject's age, find appropriate table, and enter with Predicted Raw Score to find Vocabulary Scaled Score. Enter this scaled score in paragraph 4 below to find centile equivalents and I.Q. equivalents.

4.

Scaled Score	Approximate z-score based on x = 10, SD = 3	Percentile	I.Q. Equivalent	Description
17	2.33	99	135	Very Superior
16	2.00	98	131	Very Superior
15	1.67	95	125	Superior
14	1.33	91	120	Superior
13	1.00	84	115	Bright Normal
12	.67	75	110	High Average
11	.33	63	105	Average
10	0.00	50	100	Average
9	.33	37	95	Average
8	.67	25	90	Low Average
7	1.00	16	85	Dull Normal
6	1.33	9	80	Dull Normal
5	1.67	5	75	Borderline
4	2.00	2	68	Defective
3	2.33	1	62	Defective

CLARKE-WAIS VOCABULARY

WORD LIST ANSWER SHEET

AND ANSWER KEY

1. **A** B C D
2. A **B** C D
3. **A** B C D
4. A B **C** D
5. A **B** C D
6. A B C **D**
7. **A** B C D
8. **A** B C D
9. A **B** C D
10. A B C **D**
11. A B **C** D
12. A **B** C D
13. **A** B C D
14. A B C **D**
15. **A** B C D
16. A **B** C D
17. A B **C** D
18. A B **C** D
19. A B C **D**
20. A **B** C D
21. **A** B C D
22. A B **C** D
23. A B **C** D
24. **A** B C D
25. A **B** C D
26. **A** B C D
27. A **B** C D
28. A B **C** D
29. A B C **D**
30. A B C **D**
31. A **B** C D
32. **A** B C D
33. **A** B C D
34. A B C **D**
35. A B C **D**
36. A **B** C D
37. A **B** C D
38. **A** B C D
39. A B **C** D
40. A B **C** D

Appendix C

Patient Description Form

The psychiatrist and/or resident in charge of the patient was asked to fill in the Patient Description Form, a 16-item forced-choice questionnaire designed to help differentiating reactive depressives from endogenous depressives. Fourteen items were derived from a review by Mendels (1968) on the nosology of depression: the endogenous-reactive concept. The consensus across factor-analytic studies indicated perfect agreement of 8 variables (5 with mean loadings in the .40 to .60 range -- a weight of 3 was given to such items; 3 with mean loadings in the .30 to .40 range -- a weight of 2 was given to such items), and fair agreement of 6 variables (a weight of 1 was given to such items). Two other items: "family history of depression and/or mania" and "depression worse in the morning" were added to the list by the authors mainly because they felt such variables would likely provide useful information for the differentiation between endogenous and reactive depressives -- a weight of 1 was given to these items. This instrument is an exploratory one; and since no validation studies have been done, the different weights given to items are fairly arbitrary.

The rating psychiatrist did not know the weight of each item. The range of score is from 0 to 29. A score of 15 or more is suggestive of endogenous depression. However, the kind of items being endorsed should also be examined.

PATIENT DESCRIPTION FORM (PDF)

NAME ______________________________

STATION ____________________ DATE ____________________

PSYCHIATRIST-IN-CHARGE or RESIDENT ____________________

Please describe the patient by marking an X beside the "Yes" or the "No" following each statement.

	Statement	Yes	No
1.	Previous episodes of depression and/or mania absent	[ ]	[1]
2.	Having middle-of-the-night insomnia	[2]	[ ]
3.	Having early morning awakening	[1]	[ ]
4.	Showing personality features suggestive of hysteria or inadequacy	[ ]	[1]
5.	Deeply depressed	[3]	[ ]
6.	Showing self-pity	[ ]	[2]
7.	Depression worst in the morning	[1]	[ ]
8.	Lacking in reactivity to environmental changes	[3]	[ ]
9.	Loss of weight	[1]	[ ]
10.	Suicidal thoughts, threats, or attempts	[1]	[ ]
11.	Absence of a family history of depression and/or mania	[ ]	[1]
12.	Somatic symptoms absent	[ ]	[3]
13.	Retarded	[3]	[ ]
14.	Precipitating stress present	[ ]	[2]
15.	Expressing guilt and/or self-reproach	[1]	[ ]
16.	Showing a loss of interest in life	[3]	[ ]

DIAGNOSIS ____________________

Note. The weights given to the items are placed in the boxes that should be marked to obtain the assigned scores.

Appendix D

Subject Information Form

SUBJECT

[redacted]NT INFORMATION

NAME ____________________

STATION ____________________

DATE OF BIRTH ____________________

MARITAL STATUS ____________________

EDUCATION ____________________

OCCUPATION (If "housewife", husband's) ____________________

PSYCHIATRIC HISTORY ____________________

MEDICATION	DOSAGE
1. ______	1. ______
2. ______	2. ______
3. ______	3. ______
4. ______	4. ______

BECK SCORE ____________________

HAMILTON SCORE ____________________

DIAGNOSIS ____________________

PSYCHIATRIST-IN-CHARGE ____________________

RESIDENT ____________________

COMMENTS ____________________

Appendix E

Consent to Participate in Research Form

UNIVERSITY OF ALBERTA HOSPITAL

CONSENT TO PARTICIPATE IN A STUDY

PATIENT ______________________ DATE __________ TIME __________

1. I agree to participate in an investigation and in relation to this hereby authorize Dr. ________________ and/or such assistants as may be selected by him, to perform the following procedure(s):

   ____

   ____

   ____

2. Dr. ________________ has explained the purpose of this study and I understand this, the risks involved and the nature of the procedure(s) outlined in Paragraph 1. (Where pertinent a typed sheet detailing this should be prepared by the Investigator and attached to this form).

3. I acknowledge that no guarantees have been made to me as to the results of the treatment.

______________________ ______________________

Witness Signature of Patient

If the patient is unable to sign or is under 18 years of age, complete the following:

The patient is a minor (__________ years of age).

or

The patient is unable to sign because ______________________

As the closest relative or legal guardian I hereby sign on his/her behalf:

______________________ ______________________ ______________________

Witness Signature Relationship

Appendix F

Self-Rating of Performance Forms

NAME ____________________ DATE ____________

EXPERIMENTAL SESSION ____________________

How well did you perform on these tasks compared to other people your age and background? Put [X] in the appropriate box.

VERY INFERIOR	INFERIOR	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE	SUPERIOR	VERY SUPERIOR
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

NAME ______________________________ DATE ________________

EXPERIMENTAL SESSION ________________

How well would you like to perform on these tasks compared to othe[r] people of your age and background? Circle one number.

VERY INFERIOR	INFERIOR	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE	SUPERIOR	VERY SUPERIOR
1	2	3	4	5	6	7

Appendix G

Skill and Chance Task Record Forms

SKILL TASK

Trial	Before-trial Expectancy (0 to 10)
1*	______
2	______
3	______
4	______
5	______
6	______
7	______
8	______
9	______
10*	______

After task expectancy = ______

Trial 2 expectancy minus Trial 1 expectancy = ______

Total amount of expectancy change in expected direction[a] = ______

Total amount of expectancy change in opposite direction[a] = ______

*Reinforced trial.

[a]Summing the absolute value of the difference in expectancies between one trial and the next for all trials.

CHANCE TASK

Trial	Before-Trial Expectancy (0 to 10)	Slide	Guess (0 or X)
1*		1*	
		2*	
		3*	
		4*	
		5*	
2		1	
		2	
		3	
		4	
		5	
3		1	
		2	
		3	
		4	
		5	
4		1	
		2	
		3	
		4	
		5	
		1	
		2	
		3	
		4	
		5	

Trial	Before-Trial Expectancy (0 to 10)	Slide	Guess (0 or X)
6	____	1	____
		2	____
		3	____
		4	____
		5	____
7	____	1	____
		2	____
		3	____
		4	____
		5	____
8	____	1	____
		2	____
		3	____
		4	____
		5	____
9	____	1	____
		2	____
		3	____
		4	____
		5	____
10*	____	1*	____
		2*	____
		3*	____
		4*	____
		5*	____

After task expectancy = ____

Trial 2 expectancy minus Trial 1 expectancy = ____

Total amount of expectancy change[a]:
in expected direction = ____
in opposite direction = ____

*Reinforced trial or slide.

[a]Summing the absolute value of the difference in expectancies between one trial and the next for all trials.

Procedures to obtain a random 50% reinforcement schedule for the trials and the slides within trial in the chance task and the skill task.

CHANCE TASK

There are 10 trials, each with 5 slides, i.e., there are 50 slides. 50% reinforcement schedule demands that there be 5 reinforced trials and 25 reinforced slides. Since Trials 1 and 10 are predetermined to be positively reinforced trials, the following random selection procedures apply only to Trials 2 to 9. The overall pattern of reinforcement should look like this:

No. of trials	No. of slides per trial to be reinforced	
2	5	Success
3	4	Success
3	1	Failure
2	0	Failure

Two sets of numbered balls (or chips) are required.
Set A: 8 balls numbered 2 to 9 to represent Trials 2 to 9.
Set B: 5 balls numbered 1 to 5 to represent Slides 1 to 5.

(1) Draw 3 balls from Set A to determine the 3 trials to be reinforced.

(2) Draw 1 ball from Set B to determine the 1 slide that is not to be reinforced for each of the 3 trials chosen by step (1) above.

(3) Draw 3 balls from the remaining 5 balls of Set A to determine the 3 trials with only 1 slide to be reinforced.

(4) Remember: Replace the ball drawn in Step (2). Then draw 1 ball from Set B to determine the 1 slide to be reinforced for each of the 3 trials chosen by Step (3).

(5) The remaining 2 balls in Set A represent the 2 trials with 0 slide to be reinforced.

The above procedures should be carried out before Experimental Session II and each trial or slide to be reinforced should be marked with an asterisk (*) in the scoring sheet for easy recognition when the task is presented to the subject.

SKILL TASK

Simply draw 3 balls from Set A to represent which 3 of Trials 2 to 9 are to be reinforced. Mark the trials with * on the scoring sheet before the experimental session.

Appendix H

Speed Tasks Record Forms

SPEED TASKS

DIGIT SYMBOL SUBSTITUTION (Score in seconds)

Line 1. ______________________

2. ______________________

3. ______________________

4. ______________________

5. ______________________ $\bar{X}$= ______________

TAPPING SPEED (Score in number of tappings)

Trial 1. ______________________

2. ______________________

3. ______________________ $\bar{X}$= ______________

REACTION TIME (Score in seconds)

Simple: Trial 1. ________ 4. ________

2. ________ 5. ________

3. ________ 6. ________ $\bar{X}$= ______________

Complex: Trial (Level 1)

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________

Trial	Dial Setting Stimulus	Response
1	3	3
2	1	1
3	2	2
4	2	2
5	3	3
6	1	1

$\bar{X}$= ______________

Complex: Trial (Level 2)

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________

Trial	Dial Setting Stimulus	Response
1	2	1
2	3	2
3	1	3
4	2	1
5	1	3
6	3	2

$\bar{X}$= ______________

$\bar{\bar{X}}$= ______________

NECKER CUBE REVERSAL (Viewing Box)

Trial: Minute	Trial: 10-second interval	Number of reversals	Duration (seconds): Phase I (Normal)	Duration (seconds): Phase II (Reversed)
1	1			
	2			
	3			
	4			
	5			
	6			
	$\bar{X}$			
2	1			
	2			
	3			
	4			
	5			
	6			
	$\bar{X}$			
3	1			
	2			
	3			
	4			
	5			
	6			
	$\bar{X}$			
	$\bar{\bar{X}}$			

VASE-FACE REVERSAL (Card)

Trial		Number of reversals	Duration (seconds)	
Minute	10-second interval		Phase I (Vase)	Phase II (Face)
	1			
	2			
1	3			
	4			
	5			
	6			
	$\bar{X}$			
	1			
	2			
2	3			
	4			
	5			
	6			
	$\bar{X}$			
	1			
	2			
3	3			
	4			
	5			
	6			
	$\bar{X}$			
	$\bar{\bar{X}}$			

NECKER CUBE REVERSAL (Card)

Trial		Number of reversals	Duration (seconds)	
Minute	10-second interval		Phase I (Normal)	Phase II (Reversed)
1	1			
	2			
	3			
	4			
	5			
	6			
	$\bar{X}$			
2	1			
	2			
	3			
	4			
	5			
	6			
	$\bar{X}$			
3	1			
	2			
	3			
	4			
	5			
	6			
	$\bar{X}$			
	$\bar{\bar{X}}$			

Appendix I

Correlation Matrices Used in Factor Analyses

(a) Correlation Matrix for 22 Variables and 80 Subjects

Variable	TS	SRT	CRT1	CRT2	DS	CWIQ
TS	1.00000					
SRT	-0.49263	1.00000				
CRT1	-0.54132	0.78998	1.00000			
CRT2	-0.56245	0.75445	0.86574	1.00000		
DS	-0.48907	0.47473	0.56625	0.56131	1.00000	
CWIQ	0.35629	-0.33533	-0.35598	-0.39700	-0.30217	1.00000
Age	-0.25430	0.26794	0.30436	0.3[illegible]4	0.31529	-0.27248
EPQP	-0.01575	0.07526	0.12651	0.07796	0.13066	-0.15230
EPQ-E	0.26811	0.08691	0.05159	0.00742	-0.01178	-0.03300
EPQ-N	-0.24432	0.06774	0.06111	0.09083	0.09736	-0.32242
Beck	-0.26049	0.14476	0.17499	0.17758	0.10679	-0.31723
Zung	-0.29816	0.16446	0.23813	0.23156	0.11353	-0.33324
Hostility	-0.15343	-0.03415	0.02186	-0.04372	0.14652	-0.27844
Rotter	-0.14535	0.065[illegible]	0.13335	0.13147	-0.08585	-0.17057
Skill ATE	0.09026	-0.18388	-0.15494	-0.12375	0.06022	0.05380
Skill T1T2	0.18943	-0.10322	-0.[illegible]348	-0.19600	-0.16293	0.19702
Skill TCE	-0.12933	-0.03806	-0.06753	-0.01952	-0.01696	-0.11429
Chance ATE	0.04679	-0.06283	-0.[illegible]26	0.05740	0.13906	0.04537
Chance T1T2	-0.05804	-0.13005	-0.01242	-0.01477	-0.07857	0.06936
Chance TCE	-0.20938	[illegible].14269	0.26188	0.18040	0.18612	-0.14355

Matrix (a) (Continued)

Variable	Age	EPQ-P	EPQ-E	EPQ-N	Beck	Zung	Hostility
Age	1.00000						
EPQ-P	-0.32074	1.00000					
EPQ-E	0.07224	-0.09716	1.00000				
EPQ-N	-0.02541	0.13099	-0.50801	1.00000			
Beck	0.11601	0.24918	-0.45917	0.72133	1.00000		
Zung	0.10328	0.27006	-0.40488	0.70867	0.91143	1.00000	
Hostility	-0.15485	0.50357	-0.[illegible]6288	0.65243	0.55413	0.53916	1.00000
Rotter	-0.11736	0.13042	-0.37361	0.44355	0.40296	0.37834	0.29676
Skill ATE	0.05738	-0.12897	0.17107	-0.20937	-0.32535	-0.35459	-0.14817
Skill T1T2	-0.09626	0.04935	-0.02028	0.03584	-0.00347	-0.02288	0.04569
Skill TCE	-0.05344	0.15367	-0.15846	0.18746	0.16161	0.19003	0.30922
Chance ATE	0.04162	-0.14525	0.27836	-0.24082	-0.24701	-0.25360	-0.21576
Chance T1T2	0.12767	-0.16086	-0.09276	0.14437	-0.02503	-0.02982	0.17874
Chance TCE	0.00551	0.19787	-0.00199	0.18867	0.21262	0.25211	0.28456

Variable	Rotter	Skill ATE	Skill T1T2	Skill TCE	Chance ATE	Chance T1T2	Chance TCE
Rotter	1.00000						
Skill ATE	-0.36240	1.00000					
Skill T1T2	0.00274	0.24046	1.00000				
Skill TCE	0.21450	0.09807	0.55441	1.00000			
Chance ATE	-0.37155	0.50762	-0.06947	0.30355	1.00000		
Chance T1T2	0.06005	0.10665	0.24796	0.16399	-0.01316	1.00000	
Chance TCE	0.08403	-0.02355	0.18508	0.46513	-0.13503	0.35213	1.00000

(b) Correlation Matrix for 22 Variables and 60 Subjects

Variable	TS	SRT	CRT1	CRT2	DS	CWIQ
TS	1.00000					
SRT	-0.51800	1.00000				
CRT1	-0.56168	0.79659	1.00000			
CRT2	-0.55838	0.76009	0.86769	1.00000		
DS	-0.43577	0.46965	0.56522	0.53338	1.00000	
CWIQ	0.27525	-0.35671	-0.37825	-0.39614	-0.21878	1.00000
[illegible]	-0.22921	0.30258	0.34056	0.36704	0.32458	-0.17987
EPQ-P	0.11134	0.05427	0.11095	0.04337	0.05355	-0.10243
EPQ-E	0.17710	0.14254	0.10116	0.05622	0.07576	-0.11812
EPQ-N	-0.08762	-0.03147	-0.02020	-0.01806	-0.09646	-0.08004
Beck	-0.11204	-0.07427	0.12255	0.08600	-0.10961	-0.17103
Zung	-0.13275	0.10531	0.20135	0.14294	-0.11365	-0.15927
PDF	-0.35805	0.06931	[illegible]	0.09052	0.09172	0.06490
LPD	0.05086	-0.14552	0.22397	-0.23117	0.10050	0.20236
Hostility	0.03131	-0.11426	-0.04111	-0.15429	0.01121	-0.07023
Rotter	-0.12900	0.03625	0.13492	0.14219	-0.11531	-0.16974
Skill ATE	0.09625	-0.17608	-0.15299	-0.12205	0.11050	0.07712
Skill TIT2	0.13161	-0.07009	-0.13521	-0.10055	-0.12588	0.13262
Skill TOE	-0.16162	0.03724	0.10033	0.01103	0.01858	-0.08345
Chance ATE	0.09126	-0.06560	-0.04553	0.03216	-0.10659	0.06239
Chance TIT2	-0.11521	-0.11448	-0.00599	-0.00765	-0.05745	0.06075
Chance TOE	-0.29520	0.18438	0.28627	0.20531	0.20131	0.12524

Matrix (b) (Continued)

Variable	Age	EPQ-P	EPQ-E	EPQ-N	Beck	Zung
Age	1.00000					
EPQ-P	-0.35765	1.00000				
EPQ-E	0.04081	-0.01897	1.00000			
EPQ-N	-0.08277	-0.00435	-0.531[illegible]	1.00000		
Beck	0.13055	0.13798	-0.45332	0.66816	1.00000	
Zung	0.06459	0.14799	-0.39381	0.63487	0.89352	1.00000
PDF	0.37455	-0.25601	-0.16923	0.18294	0.22889	0.22093
LPD	-0.38367	0.14663	0.08282	-0.34673	-0.5968[illegible]	-0.60634
Hostility	-0.22890	0.52950	-0.23124	0.[illegible]0698	0.47594	0.45242
Rotter	-0.01471	0.07947	-0.46503	0.53072	0.50029	0.47758
Skill ATE	-0.00831	-0.12445	0.17577	-0.15908	[illegible]	-0.37827
Skill T1T2	-0.05979	0.01574	-0.22849	0.31669	[illegible]	0.13647
Skill TCE	-0.12117	0.13620	-0.30140	0.35990	0.31540	0.33194
Chance ATE	0.06180	-0.22296	0.35667	-0.32485	-0.39566	-0.40380
Chance T1T2	0.19331	-0.12848	-0.19938	0.23063	0.01826	0.00651
Chance TCE	0.00419	0.24667	-0.04022	0.19089	[illegible]25141	0.29852

Matrix (b) (Continued)

Variable	PDF	LPD	Hostility	Rotter	Skill ATE	Skill T1T2
PDF	1.00000					
LPD	-0.38189	1.00000				
Hostility	-0.07129	-0.10481	1.00000			
Rotter	0.00189	-0.30458	0.27894	1.00000		
Skill ATE	-0.01800	0.25725	-0.13687	-0.43973	1.00000	
Skill T1T2	0.08626	-0.06181	0.23882	0.02477	0.24807	1.00000
Skill TCE	-0.03119	-0.17581	0.40510	0.35012	0.03577	0.55626
Chance ATE	-0.06884	0.12687	-0.33760	-0.45295	0.58756	-0.08097
Chance T1T2	0.08672	-0.07924	0.22521	-0.03874	0.11459	0.33931
Chance TCE	0.07075	-0.19905	0.31271	0.11443	0.00071	0.19004

Variable	Skill TCE	Chance ATE	Chance T1T2	Chance TCE
Skill TCE	1.00000			
Chance ATE	-0.36357	1.00000		
Chance T1T2	0.19002	-0.00789	1.00000	
Chance TCE	0.49008	-0.15339	0.32726	1.00000